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Volume IV

V. L. Komarov, Editor

Liliiflorae and Microspermae

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The Botanical Institute of the Academy of Sciences of the U. S. S. R.

FLORA OF THE U.S.S.R.

(Flora SSSR)

Volume IV

Liliiflorae and Microspermae

Chief Editor and Editor of This Volume
Academician V. L. Komarov

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Family Liliaceae, key to subfamilies and genera Lilium and Lloydia; family Amarillidaceae and key to genera of this family	Arranged by V.L. Komarov
Genera: Tofieldia, Narthecium, Stenantium, Zygadenus, Acelidanthus, Veratrum, Clintonia, Smilacina	Arranged by O.I. Kuzeneva
Genera: Merendera, Bulbocodium, Colchicum, Asphodeline, Anthericum, Funkia, Hemerocallis, Danaë, Ruscus, Gladiolus	Arranged by Chernyakovskaya
Genera: Eremurus, Majanthemum, Disporum, Streptopus; family Iridaceae, except the genus Gladiolus and the section Juno of the genus Iris	Arranged by B.A. Fedchenko
Genera: Gagea and Scilla	Arranged by A.A. Grossgeim
Genera: Allium, Tulipa, Ungernia, section Juno of the genus Iris	Arranged by A.I. Vvedenskii
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Genera: Sternbergia, Ixiolirion, Narcissus, Pancratium	Arranged by S.G. Gorshkova
Family Dioscoreaceae	Arranged by N.F. Goncharov
Order Microspermae	Arranged by S.A. Nevskii
Indications concerning occurrence of fossilized plants	Arranged by A.N. Krishtofovich

Addenda – Descriptiones plantarum novarum in Tomo IV Florae URSS commemoratarum.

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* [This Index has been reproduced photographically from the Russian original.]

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2734. 82. I. Tubergeniana Foster 573
2735. 83. I. caucasica Hoffm. 574
2736. 84. I. pseudocaucasica Grossh. 574
2737. 85. I. drepanophylla Aitch. et Baker. 575
2738. 86. I. kopetdaghensis Vved. 575
2739. 87. I. leptorhiza Vved. 576

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—— * S. angustifolium Mill. 578

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2745. 5. G. palustris Gaud. 583
2746. 6. G. imbricatus L. 583
2747. 7. G. Kotschyanus Boiss. 584
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2749. 9. G. halophilus Boiss. 588

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2751. 2. C. Yatabeanum Makino 597
2752. 3. C. macranthum Sw. 598
2753. 4. C. calceolus L. 598

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Genus 312. *Microstylis* Nutt.

2755. 1. M. monophyllos (L.) Lindl. 601

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2756. 1. L. Loeselii (L.) L. C. Rich. 602
2757. 2. L. japonica (Miq.) Maxim. 603
2758. 3. L. Makinoana Schlechter 603

Genus 314. *Calypso* Salisb.

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Genus 315. *Ephippianthus* Rchb.

2760. 1. E. Schmidtii Rchb. f. 607

Genus 316. *Corallorhiza* Hall.

2761. 1. C. trifida Chatel. 608

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2762. 1. O. patens Lindl. 609

Tribe III. CYRTOPODIEAE PFITZER.

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2763. 1. E. turkestanica (Litw.) Schlechter 610

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2764. 1. P. japonica Rchb f. 611

Genus 320. *Listera* R. Br.

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2766. 2. L. cordata (L.) R. Br. 613
2767. 3. L. brevidens Nevski 613
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2772a. 1. N. ussuriensis Kom. et Nevski 617, 620

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2774. 2. E. Royleana Lindl. 622
2775. 3. E. veratrifolia Boiss. et Hoh. 623
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2783. 3. C. grandiflora (L.) Babing. 632
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2786. 6. C. rubra (L.) L. C. Rich. 634

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2788. 1. E. aphyllum (Schmidt) Sw. 635

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2791. 2. S. amoena (M. B.) Spreng. 638
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Genus 328. *Goodyera* R. Br.

2793. 1. G. repens (L.) R. Br 639

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2794. 1. Z. strateumatica (L.) Schlechter 640

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2796. 2. H. dianthoides Nevski 642

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2797. 1. H. monorchis (L.) R. Br 643

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2798. 1. Ch. alpinus (L.) L. C. Rich. 644

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2799. 1. N. cucullata (L.) Schlechter 645

Genus 334. *Neolindleya* Kränzl.

2800. 1. N. camtschatica (Cham.) Nevski 646

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2801. 1. C. viride (L.) Hartm. 647

Genus 336. *Leucorchis* E. Mey.

2802. 1. L. albidus (L.) E. Mey. 649

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2803. 1. P. Chorisianum (Cham.) Nevski 650

Genus 338. *Perularia* Lindl.

2804. 1. P. fuscescens (L.) Lindl. 651
2805. 2. P. ussuriensis (Maxim.) Schlechter 652

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2806. 1. P. bifolia (L.) L. C. Rich. 656
2807. 2. P. extremiorientalis Nevski 657
2808. 3. P. chlorantha Cust. 658
2809. 4. P. Freynii Kränzl. 659
2810. 5. P. sachalinensis F. Schmidt 660

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2811. 6. P. tipuloides (L. f.) Lindl. 660
2812. 7. P. ophryoides F. Schmidt 661
2813. 8. P. cornu-bovis Nevski 662

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2814. 1. L. oligantha (Turcz.) Nevski 663

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2815. 1. L. convallariaefolius (Fisch. ex Lindl.) Rydb. 665
2816. 2. L. dilatatus (Pursh) Rydb. 665
2817. 3. L. hologlottis (Maxim.) Nevski 666

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2818. 1. G. odoratissima (L.) L. C. Rich. 667
2819. 2. C. conopsea (L.) R. Br. 668

Genus 343. *Galeorchis* Rydb.

2820. 1. G. cyclochilus (Franch. et Sav.) Nevski 669

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2821. 1. Ch. secunda Nevski 670

Genus 345. *Traunsteinera* Rchb. f.

2822. 1. T. globosa (L.) Rchb. f. 671
2823. 2. T. sphaerica (M. B.) Schlechter. 672

Genus 346. *Steveniella* Schlechter.

2824. 1. S. satyrioides (Stev.) Schlechter. 675

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2825. 1. C. taurica C. Koch 676

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2826. 1. O. palustris Jacq. 680
2827. 2. O. coriophora L. 681
2828. 3. O. mascula L. 683
2829. 4. O. pallens L. 684
2830. 5. O. provincialis Balb. 685
2831. 6. O. viridifusca Alb. 685
2832. 7. O. morio L. 686
2833. 8. O. picta Lois. 686
2834. 9. O. caspia Trautv. 688
2835. 10. O. chlorotica Woron. 689
2836. 11. O. Fedtschenkoi E. Czerniak. 689

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2838. 13. O. tridentata Scop. . . . 691
2839. 14. O. militaris L. . . . 691
2840. 15. O. simia Lam. . . . 693
2841. 16. O. purpurea Huds. . . . 694
2842. 17. O. maxima C. Koch . . . 695
2843. 18. O. punctata Stev. . . . 696
2844. 19. O. Schelkownikovii Woron. . . . 697

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2845. 20. O. iberica M. B. . . . 700

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2846. 21. O. flavescens C. Koch . . . 701
2847. 22. O. romana Seb. et Maur. . . . 702
2848. 23. O. sambucina L. . . . 702

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2850. 25. O. Fuchsii Druce. . . . 704
2851. 26. O. amblyoloba Nevski. . . . 707
2852. 27. O. triphylla C. Koch . . . 708
2853. 28. O. euxina Nevski . . . 709
2854. 29. O. aristata Fisch. . . . 710
2855. 30. O. Traunsteineri Saut. . . . 711
2856. 31. O. baltica Klinge . . . 712
2857. 32. O. salina Turcz. . . . 713
2858. 33. O. umbrosa Kar. et Kir. . . . 714
2859. 34. O. sanasunitensis Fleischm. . . . 715
2860. 35. O. cruenta Muell. . . . 716
2861. 36. O. latifolia L. . . . 717

Genus 349. *Anacamptis* L. C. Rich.

2862. 1. A. pyramidalis (L.) L. C. Rich. . . . 718

Genus 350. *Himantoglossum* W. D. Koch.

2863. 1. H. caprinum (M. B.) Spreng. . . . 719
2864. 2. H. formosum (Stev.) C. Koch . . . 720

Genus 351. *Serapias* L.

2865. 1. S. vomeracea (Burm.) Briq. . . . 721

Genus 352. *Ophrys* (L.) Swartz.

2866. 1. O. muscifera Huds. . . . 725
2867. 2. O. transhyrcana E. Czerniak. . . . 726
2868. 3. O. caucasica Woron. . . . 727
2869. 4. O. taurica (Agg.) Nevski . . . 728
2870. 5. O. oestrifera M. B. . . . 729
2871. 6. O. apifera Huds. . . . 730

1

Family XXXIII. **LILIACEAE** HALL.

Flowers commonly undifferentiated into calyx and corolla, with 6 distinct or more or less united perianth segments of same color; stamens 6; ovary in USSR plants superior, mostly 3- (rarely 2-4-5) locular with axile placention, rarely unilocular with parietal placentation; anthers distinct, nearly always 2-celled, Saccharophilous plants with fleshy lustrous leaves and thickened roots, producing bulbs or corms. Seeds containing endosperm.

Very few fossilized remnants of this family exist, *Smilax* being the only fully authenticated genus. Such remnants as *Agavites kioviensis* Rogow. and *A. priscus* Kis. from the Eocene of M. Dnp. (Kiev), *Convallarites reinekiodes* Schmalh. from the Oligocene of M. Dnp. (Volhynia), and *Liliophyllites* sp. from M. Dnp. (Volhynia) are rather dubious.

Key to Subfamilies

1. Fruit a capsule . . . . . 2.
+ Fruit a berry . . . . . 5.
2. Tips of carpels distinct, somewhat spreading; inflorescence a simple or forked terminal raceme; plants with rhizomes, bulbs or corms. . . . . 1. **Melanthioideae**, page 2.
+ Tips of carpels fully united; capsule rounded, flat or concave at the top. . . . . 3.
3. Rhizome; leaves all radical, except in *Asphodeline* in which stem is leafy, but pedicels of this plant jointed; inflorescence terminal; capsule with dehiscent locules . . . . . 2. **Asphodeloideae**, page 24.
+ Bulb or rarely a short horizontal rhizome . . . . . 4.
4. Inflorescence umbelliform, with 2 broad subtending leaves, rarely with 2 narrow bracts, very rarely flowers solitary. . . . . 3. **Allioideae**, page 46.
+ Inflorescence paniculate or umbelliform, or flowers solitary; subtending leaves none . . . . . 4. **Lilioideae**, page 216.
5. Underground rhizome branched; tips of branches prolonged into leafy vertical shoots or giving rise to lateral aerial stems; leaves with arched venation . . . . . 5. **Asparagoideae**, page 324.
2 + Scandent plants with reticulate leaf venation; flowers small in axillary umbels . . . . . 6. **Smilacoideae**, page 362.

Subfamily 1. **Melanthioideae** ENGL.

(Family Melanthaceae R. Br. 1810).

Leaves with parallel venation; flowers solitary or gathered in a raceme or panicle, regular; perianth segments mostly distinct, usually persistent in fruit, in the genus Colchicum united in lower part into a tube; anthers small, 2-celled, oblong or ovaloid; styles 3; capsule septicidal; seeds often appendaged.

1. Perianth open, stellate or rarely campanulate, the segments distinct to base or nearly so . . . . . 3.
+ Perianth forming a narrow long tube in lower part; flower solitary. . . 7.
2. Anthers oblong or ovaloid, with distinct cells; flowers in a dense raceme; flowers subtended by 3 bracts; seeds unappendaged . . . . . 252. **Tofieldia** Huds.
+ Anthers cordate or reniform, with fused cells . . . . . 2.
3. Leaves linear to lanceolate, to 10 mm broad; the whole plant smooth. . . . . 4.
+ Lower and middle cauline leaves 1–20 cm broad; pedicels pubescent. . . . . 257. **Veratrum** L.
4. Plants rhizomatose; inflorescence dense . . . . . 5.
+ Plants cormatose; inflorescence rather loose . . . . . 6.
5. Filaments of stamens tomentose; style 1 . . . . . 253. **Narthecium** Huds.
+ Filaments of stamens glabrous; styles 3 . . . . . 256. **Acelidanthus** Trautv. et Mey.
6. Flowers few, 2–4 in raceme; perianth campanulate . . . . . 254. **Stenanthium** Kunth.
+ Flowers in a loose racemiform panicle; perianth with horizontally spreading segments . . . . . 255. **Zygadenus** Michx.
7. Perianth with united segments, infundibular-campanulate, with a long cylindric tube . . . . . 260. **Colchicum** L.
+ Perianth segments free, with long narrow claws . . . . . 8.
8. Styles 3, quite distinct . . . . . 258. **Merendera** Ramond.
+ Style 1, 3-fid in upper part . . . . . 259. **Bulbocodium** L.

3

Genus 252. **TOFIELDIA** * HUDS.**

Huds. Fl. angl. ed. 2(1778) 157.

Perianth corollalike, deeply 6-parted, wide open, peristent in fruit; stamens 6, inserted at the base of perianth segments; filaments dilated at base; anthers 2-celled; pistil with 3 short styles; stigma capitate; fruit a trilocular capsule, dividing into 3 fruitlets; seeds numerous.

1. Bracteole 1 at the base of pedicel, 3-lobed . . . . 1. **T. palustris** Huds.
+ Bracteoles 2, the lower lanceolate at the base of pedicel, the upper at the base of perianth . . . . . 2.
2. Cauline leaves 2–4; radical leaves with 7 or more veins . . . . . 4. **T. calyculata** Wahb.
+ Cauline leaves 1 or 2 or none; radical leaves mostly 5-nerved. . . . . 3.

* Named after the Englishman Tofield, correspondent of Hudson in 1778.

** Arranged by O.I. Kuzeneva.

3. Inflorescence an elongated spikelike raceme, with distant leaves, 2–12 cm long; anthers pale yellow . . . . . 3. **T. cernua** Smith.

+ Inflorescence compact, capitate in flower; fruiting inflorescence not more than 2 cm long; anthers dark violet . . . . . 2. T. nutans Willd.

1. **T. palustris** Huds. Fl. angl. I (1778) 157; Ldb. Fl. Ross. IV, 209; Kryl., Fl. Zap. Sib. III, 588. — T. borealis Whlb. Fl. Lapp. (1812) 89. — Ic.: Rchb. Ic. Fl. Germ. X (1848) 934, 935. — Exs.: Fl. Finl. exs. No. 569.

Perennial; stem erect, 5–30 cm long, leafy only at base; leaves lanceolate, short-acuminate, (1.5) 3–5 (7) cm long, 1–2.7 mm broad, commonly 3-nerved, the margin thinly and finely prickly-ciliate; raceme short, fairly compact except the somewhat looser base, 1–2 cm long, 5–6 cm broad; pedicels short (ca. 1/2–3/4 mm in flower and 1–2 mm in fruit); bracteole 1 at base of flower, cleft to 2/3 into ovate obtuse lobes; perianth segments whitish, oblong-ovate, obtuse, 2–2.5 mm long, 0.3–1.0 mm broad; stamens as long as perianth; styles short, the length of perianth; capsule rounded-ovoid, 2.5–3 mm long, 2–2.3 mm broad; seeds ferruginous-brown, oblong, laterally compressed, ca. 0.7 mm long. June–July.

Tundras, coastal sands, shores of mountain streams, and rarely mossy bogs. — Arctic: Arc. Eur., Arc. Sib., Chuk.; European part: Kar.-Lap., Dv.-Pech., V.-Kama (alpine zone of Urals); E. Siberia: Lena-Kol. (N.), Ang.-Say. (balds). Gen. distr.: Arc., Scand., Centr. Eur., Atl. Eur., N. Am. Described from Scotland. Type in London.

2. **T. nutans** Willd. ex L. Syst. Veg. curant. Schultes VII, 2 (1830) 1573 in obs.; Ldb. Fl. Ross. IV, 210; Kryl., Fl. Zap. Sib. III, 583; Kom. Fl. Kamch. I, 289. — T. coccinea Rich. in R. Br. Verm. Schr. I, 481; Ldb. l.c. 210, ex parte. — Ic.: Hultén, Fl. of Kamtch. I (1927) f. 15.

Perennial; stems erect, 4–10 (15) cm long, mostly bearing 2 leaves; radical leaves numerous, lance-linear, acuminate, crenulate-margined, white in lower part, green above, mostly 5-nerved, one-fourth to half the length of stem, 1–4 cm long, 1–4 mm broad; cauline leaves minute; inflorescence initially compact, 6–10 mm long, at length elongating and becoming loose; pedicels at first ca. 0.5 mm long, gradually elongating, 1–3.5 mm long in fruit, horizontally spreading to declined; bracteoles 2: the lower subtending the pedicel, foliaceous, ovate, acuminate, to 1 mm long, initially exceeding the pedicel, the upper tightly adhering to perianth base, calyculate, ca. 1 mm long, parted to 1/3–2/3 into 3 broadly triangular acuminate lobes; perianth segments elongate-obovate, pale yellow, violet-tinged; capsule exceeding the perianth, rounded-ovoid; seeds yellowish-brown. July, rarely August.

Arctic and alpine zones, dry tundras, stony slopes, and sandy places. — Arctic: Arc. Sib., Chuk.; E. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Kamch., Okh., Ze.-Bu., Uda, Uss., Sakh. **Gen. distr.**: Japan, N. America (Alaska). Described from E. Siberia. Type in London.

3. **T. cernua** Smith in Trans. Linn. Soc. XII (1817) 244; Ldb. Fl. Ross. IV, 210. — Ic.: (sub Anthericum) Gmel. Fl. Sib. I (1747) ab. 18, f. 2.

Perennial; stem erect, (15) 20–40 cm long, mostly with one leaf in lower part; radical leaves numerous, mostly 5-nerved, 3–8 cm long, 2–4 mm broad; inflorescence terminal; raceme elongate-cylindric, loose, (1) 2–7 (12) cm long; pedicels mostly drooping, especially after anthesis, as long as the flower; bracteoles 2, one at base ca. 1 mm long, the other calyculate at perianth base, 3-lobed, scarious; perianth yellowish-white, the segments 3–4 mm long; capsule 3–4 mm long, 3–4 mm broad. July–August. (Plate I, Figure 1 a-c).

Wet stony slopes, mountain passes; pine, spruce and broad-leaved mountain woods. — E. Siberia: Lena-Kol., Ang.-Say., Dau. Endemic. Described from the Lena River.

4. **T. calyculata** Wahlb. Fl. Lapp. (1812) 90; Ldb. Fl. Ross. IV, 210; Ic.: Rchb. Ic. Fl. Germ. X (1848) 930. — Exs.: HFR No. 641.

Perennial; stem erect, rarely somewhat nodding, (10) 15–30 (45) cm long; leaves radical and cauline, sessile, linear, many-nerved, gradually acuminate; radical leaves 5–15 (23) cm long, 2–4 mm broad; lower cauline leaves flat, linear, the upper minute abbreviated; inflorescence a terminal, erect, mostly cylindric, rarely capitate, simple or rarely branched, 4–6 (12) cm long, spiciform raceme, the flowers in lower part mostly distant; pedicels shorter than flower; bracteoles 2, the lower subtending the pedicel lanceolate, the other at perianth base 3-lobed; perianth segments yellowish-white, 3–3.5 mm long; stamens 6; styles 3, short; capsule 3–3.5 mm long, ovoid to rounded-ovoid, many-seeded; seeds elongated, cinnamon-brown. June-July.

Wet and dry peat bogs, calcareous and stony places. — European part: U. Dnp., M. Dnp. **Gen. distr.**: Scand. (E. Balt.), Centr. Eur., Atl. Eur., and Med. (Pyrenees). Described from Gotland Island. Type in Uppsala.

Genus 253. **NARTHECIUM*** (MOEHR.) HUDS.**

Moehr. in Acta Acad. nat. curios. (1742) 389, t. 5, f. 1; Huds. Fl. Angl. (1767) 128.

Perianth corollalike, 6-parted, the segments spreading persistent; filaments of stamens tomentose; style 1, with 3-lobed stigma; capsule conical, loculicidal; stem [?] with an elongated filiform appendage at the end and at base. Perennials.

1. **N. caucasicum** Miscz. Fl. cauc. cirt. fasc. 33 (1912) 82.

Perennial; rhizome long, creeping; stems 11–25 cm long, leafy at base; leaves linear-ensiform, sheathing, 5–9 (11) cm long, 2–3 cm broad; sheath broadly hyaline-margined; cauline leaves mostly 3 or 4, divergent, decreasing in size up the stem; raceme rather dense; pedicels as long as or scarcely longer than flower; bracts recurved, acuminate; perianth 6 mm long, the segments elongate obtuse; filaments shorter than perianth, densely villous with hairs of equal length; ovary conical; style rather thick, gradually attenuate. June-August.

* From Greek narthex, alluding to large umbels.

** Arranged by O.I. Kuzeneva.

Near streams in the alpine zone. — Caucasus: W. Transc. Endemic. Described from Klukhor Pass. Cotype in Leningrad.

6 Genus 254. **STENANTHIUM*** KUNTH**

Kunth Enum. pl. IV (1843) 189.

Perianth 6-parted, colored; perianth segments without glands, slightly spreading and divergent; stamens 9, inserted at base; filaments filiform-subulate; anthers reniform, 1-celled, extrorse; ovary subinferior, trilocular, with numerous ovules in each locule; styles 3, with simple stigma; capsule elongated, 3-parted, topped by the style; seeds numerous, compressed.

1. **S. sachalinense** F. Schmidt., Mém. Acad. Sc. Pétersb. VII sér. VII 2 (1868) 188. — Ic.: ibid. t. IV, f. 1–7.

Perianth; bulb small, oblong-ovaloid, with a coriaceous tunic; stem smooth, 17–30 cm long, 1–1.2 mm thick; radical leaves 2 or 3, shorter than stem, lanceolate to linear-lanceolate, acuminate, slightly narrowed toward base, 10–20 cm long, 3–8 mm broad, green; capsule leaves 1 or 2, small, the lower green, the upper often reddish like the bracts; inflorescence a simple loose raceme; flowers 2–4, nodding; pedicels shorter than to rarely as long as perianth, subtended by elliptic reddish bracts; perianth campanulate at base, green; perianth segments with reddish-tinged reflexed tips, the outer 3 lanceolate, 10–13 mm long, of about equal breadth at base, 2.5–3 mm broad, parallel-nerved throughout, acuminate, the 3 inner ones ovate-lanceolate, broader, winged in lower part, nerveless on the wings, 3.5–4 mm broad; stamens reaching the limb of perianth segments; immature seeds flat, lanceolate, winged at the tip. June-July. (Plate I, Figure 2a).

Rocks and stony slopes. — Far East: Sakh. Endemic. Described from Due area. Type in Leningrad.

9 Genus 255. **ZYGADENUS**† RICH.††

L.C. Rich. in Michx. Fl. bor. amer. I (1803) 213, t. 22.

Perianth petaloid, persistent in fruit, deeply 6-parted; stamens 6; ovary trigonous, with 3 approximate styles; fruit a trigonous capsule, with peristent style, trilocular; locules many-seeded. Seeds numerous.

1. **Z. sibiricus** (L.) A. Gray in Ann. Lyc. Nat. Hist. New-York IV (1837) 112. — Melanthium sibiricum L. Sp. pl. (1753) 332. — Leimanthium sibiricum Turcz. Cat. baic.-dah. (1838) No. 1158. — Anticlea sibirica Kunth, Enum. IV (1841) 191; Ldb. Fl. Ross. IV, 207. — Exs.: HFR No. 1243.

* From Greek stenos, narrow, and anthos, flower, alluding to the narrow perianth segments.

** Arranged by O.I. Kuzeneva.

† From Greek zygos, yoke, pair, and aden, gland, referring to the pair of nectariferous glands (nectaries) at the base of each of the perianth segments.

†† Arranged by O.I. Kuzeneva.

(7)

Plate I

1. Tofieldia cernua Smith.: a) flowers; b) fruit; c) bracteole.— 2. Stenanthium sachalinense F. Schmidt; a) perianth segments.— 3. Zygadenus sibiricus Asa Gray; a) flower; b) fruit; c) perianth segments.— 4. Acelidanthus anticleoides Fisch. et Mey.: a) flower; b) fruit.— 5. Veratrum dahuricum Turcz.; a) flower; b) perianth segments; c) fruit.— 6. V. Maackii Regel· a) fruit.

Perennial; bulb oblong-ovoid, clothed in blackish-brown leaf remnants; stem erect, simple, 20–80 cm long; leaves mostly on the lower part of stem linear, acuminate, narrowed toward base; inflorescence a loose racemelike panicle, (5) 10–25 (40) cm long; pedicels longer than or rarely as long as perianth; bracts elliptic, dark violet mostly one-fourth to half the length of or rarely as long as the pedicel; perianth short-campanulate at base, the segments whitish, greenish outside, horizontally spreading; outer segments broader, ovate-lanceolate, acuminate, 5–8 (10) mm long, 2–3 mm broad, the inner lanceolate; nectariferous glands on lower one-third of the segment; stamens 1/4–1/3 shorter than perianth; anthers reniform, reddish-violet; capsule oblong-ovoid, obtusely trigonous, ca. 10 mm long, 4 mm broad; seeds ovaloid-cylindric, ca. 2.5 mm long and 3/4 mm broad, enclosed in a membrane about twice the length of the seed. June-August. (Plate I, Figure 3 a-e).

Sparse woods, more rarely dry meadows, scrub and rock crevices.— European part: V.-Kama; Siberia: all regions except U. Tob.; Far East: all regions except Kamchatka and Sakhalin. **Gen. distr.**: Mongolia and China. Described from Siberia. Type in London.

Genus 256. **ACELIDANTHUS*** TRAUTV. et MEY.**

Trautv. et Mey. Fl. Ochot. (1856) 94.

Perianth persistent in fruit, 6-parted, the segments distinct at base; stamens 6, with capitate anthers; ovary trigonous, 3-lobed in upper part; pistils 3, arched-recurved; stigma capitate; seeds numerous, exceeded by the membranous envelope.

10 Flowers bisexual, though unisexual flowers with abortive ovary occur.

1. **A. anticleoides** Trautv. et Mey. Fl. Ochot. (1856) 95.— *Veratrum anticleoides* Taketa et Miyake in Botan. Mag. Tokyo (1910) 253.— Ic.: Trautv. et Mey. ibid. tab. No. 28.

Perennial; rhizome short, vertical, densely reticulate-fibrillose in upper part by disintegration of leaf bases; stem erect, simple, terete, smooth, 25–40 (50) cm long; radical leaves 5 or 6, broadly linear, 18–24 cm long, (2) 6–10 (12) mm broad, acuminate, entire, glabrous on both sides; cauline leaves 2 or 3, smaller; raceme erect, fairly compact, 10–20 (30) cm long; pedicels of upper flowers 2–4 mm long, those of lower flowers up to 7–8 mm long; bracts linear-lanceolate, the upper as long as or even longer than flower, the lower not reaching half the length of flower; perianth green, glabrous, ca. 1 cm across; segments oblong, acute, narrowed at base, 5–7 mm long, 2–7 mm broad; stamens 6; capsule glabrous, 8–13 mm long; seeds compressed, ellipsoid, 3–4 mm long. July-August. (Plate I, Figure 4 a, b).

Balds and mountain slopes.— Far East: Uda, Uss., Sakh. **Gen. distr.**: S. part of Sakhalin. Described from Uda area. Type in Leningrad.

* From Greek a, without, *kelis*, spot, and *anthos*, flower, alluding to absence of spots on flower.
** Arranged by O.I. Kuzeneva.

Genus 257. **VERATRUM** L.*

L. Sp. pl. (1753) 1044.

Perianth petaloid, 6-parted to base, wide open, persistent in fruit, stamens 6, inserted at the base of perianth segments; anthers reniform, 1-celled, opening by an apical slit; pistil with 4 divergent styles; fruit a trilocular capsule, splitting into 3 fruitlets opening on the inner side; seeds numerous, flattened, winged.

Flowers bisexual, sometimes with some staminate flowers in same inflorescence.

1. Ovary barely longer than broad; ovule 8–16 in locule; perianth dark-colored; pedicels as long as or slightly longer than perianth. Section Fuscoveratrum Loes. . . . . 2.
+ Ovary much longer than broad; ovules 16–40 in locule; perianth white or greenish; pedicels much shorter than perianth. Section Alboveratum Loes. . . . . 2.
2. Panicle dense; stem stout, with numerous strong leaves; lower leaves elliptic. . . . . 1. V. nigrum L.
+ Raceme loose; stem slender, with 1 or 2 leaves to 3 cm broad; . . . . . 2. V. Maackii Rgl.
3. Leaves densely whitish pubescent underneath; panicle pyramidal due to elongated lower branches . . . . . 3. V. dahuricum (Loes.) Turcz.
+ Leaves quite glabrous or with scattered tomentum; panicle narrow. . . 4.
4. Perianth segments 3–6 mm broad, more or less rounded at tips. . . . . 4. V. Lobelianum Bernh.
+ Perianth segments 2–3 mm broad, acutish . . . . . 5.
5. Inflorescence more or less spreading, loose . . . . . 5. V. calyciflorum Kom.
+ Inflorescence narrow or spiciform . . . . . 6.
6. Stems 50–150 cm long . . . . . 6. V. oxysepalum Turcz.
+ Stems 20–50 cm long . . . . . 7. V. Misae (Sirjaew.) Loes.

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Section 1. **FUSCOVERATRUM** Loes. fil., Verhandl. des botan. Ver. Brand. 1 (1926) 140. — Ovary barely longer than broad; ovules 8 to 16 in each focule.

1. **V. nigrum** L. Sp. pl. (1753) 1044; Ldb. Fl. Ross. VI, 208; Shmal'g. Fl. II, 512; Kryl., Fl. Zap. Sib. III, 586. — Ic.: Rchb. Ic. Fl. Germ. Vol. X (1848) tab. 423; Syreishch., Fl. Mosk. gub. I (1906) 231.

Perennial, 60–100 (130) cm tall; rhizome strong, stout, vertical, with numerous stringy root fibers, the upper part densely clothed in blackish-brown fibers (remnants of disintegrated leaf sheaths); stem terete, erect, covered in upper part with soft hairs; inflorescence rachis subtomentose; cauline leaves glabrous, plaited; lower leaves broadly elliptic, short-acuminate, 20–25 (39) cm long, 8–18 (20) cm broad, decreasing in size acropetally, the middle ones narrower, the upper linear-lanceolate; inflorescence a many-flowered branched panicle or rarely a simple raceme, 25–65 cm long; pedicels as long as to slightly longer than perianth, white-tomentose, subtended by a lanceolate puberulous-margined bract, this shorter than the pedicel; perianth wide open, blackish-red, 1.0–1.5 cm in

* Arranged by O.I. Kuzeneva.

diameter; segments oblong-elliptic, 0.5–0.7 cm long, 0.3–0.4 cm broad, subentire, the inner narrower than the outer; stamens half as long as perianth; capsule ovoid, trigonous, 1.5–2 mm long, 0.8–1 cm broad. June-August.

Dry glades and water meadows, mountain slopes, scrub, and rarely broad-leaved woods. — European part: U.V., U. Dnp., M. Dnp., V.-Don, Bl.; W. Siberia: Ob (S.), Irt., Alt.; E. Siberia: Yen., Lena-Kol. (only surroundings of Kirensk), Ang.-Say., Dau., Far East: Ze.-Bu., Uss.; Centr. Asia: Balkh. **Gen. distr.**: Centr. Eur. (mountains of Switzerland and N. Italy), Balk.; Jap.-Ch. Described from Europe. Type in London.

Note. The rhizome contains the alkaloid "nervin".

2. **V.** Maackii Rgl. in Regel' and Maak., O. Rast. Ussur. strany (1861) 169. — V. nigrum var. Maackii Maxim. in herb. — Ic.: Regel' and Maak, ibid., t. XI, f. 7–14; Kom. and Alis., Opred. rast. Dal'nevost. kr. I (1931) 110.

12 Perennial; rhizome short, straight, with a dense tuft of stringy roots, the upper part clothed in remnants of disintegrated membranous leaves or more often in blackish-brown fibers; stem erect, (60) 75–100 (125) cm long, rather smooth at base, tomentose in upper part; leaves elongate-lanceolate, narrowed toward base, acuminate, smooth on both sides, with prominent veins underneath, the lower 2 or 3 (4) larger, 20–45 cm long and (1.5) 2–3 (4) cm broad, the upper smaller, linear to narrowly lanceolate, 2–12 cm long and 0.3–1.0 cm broad, the leaves gradually decreasing in size acropetally, the uppermost resembling the bracts; panicle simple or in lower part compound, up to 45 cm long, with spreading branches; pedicels slender, as long as or longer than perianth, 0.6–1.5 cm long, more or less tomentose; bracts green lanceolate, long-acuminate, shorter than pedicel; perianth dark red (var. viridiflora Kom. occurs with small green flowers); perianth segments elliptic, elongate, obtusish to acutish, entire, spreading in anthesis, becoming reflexed, persistent, ca. 0.5 cm long; stamens half the length of perianth segments; anthers reniform; capsule smooth, ovaloid-elongate, 1.5–1.8 cm long, trigonous, with persistent linear styles; stigma oblong. July-August. (Plate I, Figure 6a).

Water meadows and woods, scrub, rarely exposed ridges. — Far East: Ze.-Bu. **Gen. distr.**: Jap.-Ch. Described from Ussuri River. Type in Leningrad.

Section 2. ALBOVERATRUM Loes. fil., Verhandl. des botan. Ver. Brand. (1926) 136. — Ovary much longer than broad; ovules 16 to 40 in each locule.

3. V. dahuricum (Turcz.) Loes. Verhandl. des botan. Ver. Brand. (1926) 134. — V. album var. dahuricum Turcz. Fl. baic.-dah. II (1861) 230.

Perennial; rhizome short, stoutish, with numerous stringy roots; stem erect, stout, terete, 50–100 (120) cm long, 1–2.5 cm in diameter, in upper part densely pubescent like the inflorescence, with remnants of leaf sheaths at base; leaves numerous, densely pubescent beneath, whitish, tomentose when young, the lower elliptic, short-acuminate,

10–20 (25) cm long, 5–10 cm broad (the 1 or 2 lowest smaller), acropetally diminishing in size and becoming increasingly lanceolate; panicle large, 30–65 cm long; pedicels 0.2–0.4 cm long, many times shorter than perianth, pubescent; bracts ovate, exceeding the pedicel, 0.4–0.7 cm long; perianth (1.4) 1.8–6.2 cm in diameter, white to yellowish-white or initially greenish-white; segments elliptic, narrowed toward base, denticulate, rarely subentire, densely pubescent outside, (0.7) 0.8–1.2 cm long, 0.3–0.6 cm broad; outer segments somewhat shorter and broader than the inner, 0.4–0.7 cm long; fruit 2–2.5 cm long and ca. 1 cm broad. July-August. (Plate I, Figure 5, a–c).

13 Water meadows and glades. — E. Siberia: Ang.-Say. (solely SE), Dau.; Far East: Ze.-Bu., Uss. **Gen. distr.**: Jap.-Ch. Described from Dauria. Cotype in Leningrad.

4. V. **Lobelianum** Bernh. in Schrad. N. Journ. 2, II (1807) 356; Loes. in Fedde, Repert, sp. nov. XXIV 4–13 (1927) 64; Kryl., Fl. Zap. Sib. III, 587. — V. album var. Lobelianum Shmal'g., Fl. II (1897). — V. album β floribus viridibus Ldb. Fl. Ross. IV (1853) 208. — Exs.: Fl. polon. exs. No. 580. — Ic.: Rchb. Ic. Fl. Germ. X (1848) 938.

Perennial; rhizome short, stoutish, with numerous stringy roots; stem erect, stout, terete, 70–170 cm long, 2–3 cm thick, clothed at base in disintegrated leaf sheaths, often fibrillose, the upper part of stem and inflorescence pubescent; leaves numerous, plaited, covered beneath with short hairs, the lower broadly elliptic, short-acuminate, 15–25 cm long, 10–15 cm broad, gradually diminishing in size acropetally, the uppermost lanceolate; inflorescence paniculate, 20–60 cm long; pedicels several times shorter than perianth segments, 2–3 mm long, pubescent; bracts rounded-ovate to rarely ovate, short-acuminate, several times the length of pedicel, 3–5 mm long; bracts whitish or yellowish-green, ca. 2.5 cm in diameter, open; leaves elliptic, narrowed at both ends, ungiculate, round-tipped, serrulate, slightly pubescent outside, 8–13 mm long, 4–6 mm broad; inner segments narrower and longer than the outer; stamens shorter than perianth segments; capsule ovoid, trigonous, ca. 2.5 cm long and 1 cm broad. June-August.

Water meadows and wet glades. — European part: Kar.-Lap., Dv.-Pech., U. V., V.-Ka., U. Dnp., M. Dnp., V.-Don, Transv.; Caucasus: Cisc., Dag., W., E. and S, Transc.; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Yen., Ang.-Say., Dau.; Far East: Ze.-Bu.; Centr. Asia: Balkh., T. Sh. **Gen. distr.**: Centr. Eur., Med., W. Balkans. Described from Switzerland. Type in Vienna (?).

Note. A poisonous plant, especially when young. The rootstock, "rhizoma veratri", contains the alkaloids nervin and veratroidin, used in medicine.

5. V. **calyciflorum** Kom. Sp. nova. in Addenda III, 733. — V. Escholtzii Asa Gray. var. Kom. Fl. Mansh. I (1901) 434.

Perennial; rhizome short, thickened, with numerous roots; stem erect, 70–150 cm long, clothed at base in disintegrated leaf sheaths; leaves numerous, thin, the lower broadly elliptic, gradually becoming lanceolate in acropetal direction, the upper arachnoid with short scattered hairs; inflorescence a loose raceme with distant long spreading branches and

14 tomentose rachis; pedicels short; perianth dark green; segments narrowly lanceolate, often dentate, acute, glabrous within, tomentose outside, the outer 1-nerved, the inner 3-nerved; stamens half the length of perianth segments. June-July.

Wood clearings and banks of forest streams, in shade. — Far East: Uss. Gen. distr.: Manchuria. Described from Uss. Type in Leningrad.

6. V. **oxysepalum** Turcz. in Bull. Soc. Nat. Moscou (1840) 79; Ldb. Fl. Ross. IV, 209. — V. album subs. oxysepalum Hulten Fl. of Kamtch. I (1927) 233. — V. album Kom. Fl. Kamtsch. I (1927) 291, non L. — V. album var. Lobelianum Kom. Fl. Mansh. I (1901) 433.

Perennial; rhizome short, thickened; stem erect, terete, 50–150 (200) cm long, in upper part often tomentulose; leaves numerous, elliptic, acuminate, 15–27 cm long, 5–12 cm broad, gradually diminishing in acropetal direction, mostly glabrous, rarely somewhat tomentulose; inflorescence compact, (15) 25–40 (60) cm long; pedicels 1–2 (3) mm long; bracts (4) 6–10 mm long, ovate; flowers 8–12 (15) mm in diameter; petals oblong-lanceolate, acuminate, 8–12 mm long, 2–3 mm broad, finely denticulate, greenish; stamens half the length of perianth; capsule ovoid-trigonous. June-August.

Meadows, scrub, wood margins, and glades. — E. Siberia: Lena-Kol., Ang.-Say., Dau; Far East: Kamch., Okh., Ze.-Bu., Uda, Uss., Sakh. Endemic. Described from Kamchatka. Type in Kharkov.

Note. Forms displaying transition toward V. Lobelianum occur in addition to typical samples.

7. V. Misae (Širjaev) Loes. in Fedde, Repert, sp. nov. XXIV, 4–13 (1927) 65; Kryl., Fl. Zap. Sib. III, 588. — V. ~~al~~bum var. Misae Šir. in Acta Bot. Bohem, Vol. II (1923) 41.

Perennial; rhizome with numerous stringy roots; stem clothed in remnants of leaf sheaths, partly fibrillose, erect, 20–40 cm long, 4–8 mm thick, in inflorescence tomentulose; leaves elliptic, short-acuminate, glabrous on both sides, ciliolate-margined, the lower 4–9 cm long and 1–4 cm broad, gradually diminishing and becoming lanceolate in acropetal direction; inflorescence paniculate-spiciform, 5–8 (18) cm long, 3–4 cm broad; pedicels short, tomentose; bracts ovate, greatly exceeding the pedicel; perianth yellowish-green, with elliptic crenate segments; stamens half the length of perianth segments. July-August.

Boggy meadows, wet tundras, banks of rivers and lakes, and thin broad-leaved woods. — Arctic.: Arc. Eur., Arc. Sib., Chuk.; European part: Kar.-Lap., Dv.-Pech. Endemic. Described from Ob Gulf and Taz Bay. Type in Bryunne [?].

Note. A species well defined in the northern belt, but with various transitional forms that link it with V. Lobelianum. The transitional plants have greater overall size and larger and more spreading inflorescence, although some are large but have a peniculate-spiciform inflorescence.

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Genus 258. **MERENDERA*** RAMOND.**

Ramond in Bull. Soc. philom. II (1798) 178, t.12

Perianth large, infundibular; segments distinct to base, unguiculate, the limb narrow, oblong, sometimes with filiform or toothlike appendages at base, the claws long, linear-filiform, longer or shorter than the limb; stamens inserted at base of perianth segments; anthers oblong or linear, basifixed or versatile; ovary trilocular, with numerous ovules; styles 3, distinct, filiform; fruit a septicidal capsule, dehiscing from the top downward; seeds globose.

Cormatose plants, the linear leaves always appearing together with flowers and enclosed in a spathe.

1. Corms poorly developed, stalked; tunic thin, of few layers; teeth at the base of petal limbs rather short, filiform . . . . . 1. **M. sobolifera** C. A. M.
+ Corms well developed, without soboles . . . . . 2.
2. Corm tunics delicate, membranous; flowers solitary . . . . . 3.
+ Corm tunics stiff, coarse; flowers several . . . . . 4.
3. Stem lateral; flowers light pink; leaves linear-lanceolate; limb of perianth segments always with long filiform teeth at base; anthers yellow, oblong, to 2 mm long . . . . . 2. **M. Raddeana** Rgl.
+ Stem arising from the center of the corm; flowers solitary, white; leaves linear-oblong to linear-lanceolate, obtuse, shorter than to as long as flower; limb of perianth segments oblong, obtuse, exauriculate; anthers yellow, linear, to 8 mm long, basifixed . . . . . 3. **M. hissarica** Rgl.
4. Limb of perianth segments auriculate; anthers small, oblong, versatile, 1.5–2 mm long . . . . . 5.
+ Limb of perianth segments exauriculate; anthers linear, 8–10 mm long, basifixed . . . . . 7.
5. Flowers white as a rule, rarely yellowish-white . . . . . 6. **M. candidissima** Miscz.
+ Flowers varying shades ranging from white to bright pink . . . . . 6.
6. Leaves at anthesis shorter than flowers; flowers commonly pink, rarely
16 whitish; limb of perianth segments 2–3 times the length of claw; teeth at base of limb short or absent, mostly confined to inner segments; spathe long . . . . . 4. **M. trigyna** (Ad.) G. Woron.
+ Leaves greatly exceeding the flowers at anthesis; flowers mostly white or scarcely pinkish; claw of perianth segments more than 3 times the length of limb; teeth at base of limb well developed, very short; spathe very short . . . . . 5. **M. Eichleri** (Egl.) Boiss.
7. Corms large, 3–4 cm in diameter; flowers large; limb 2.5–4 cm long; filaments 2–3 mm long, one-third to one-fourth the length of anther. . . . . 7. **M. robusta** Bge.
+ Corms smaller, 2–2.5 cm in diameter; limb of perianth segments 15–18–25 mm long; filaments up to 4 mm long; anthers twice the length of filament; leaves narrower, canaliculate . . . . . 8. **M. Jolantae** E. Czerniak.

* From Spanish name for Colchicum – Quita mariendas which Merendera resembles.

** Arranged by E.G. Chernyakovskaya.

1. **M. sobolifera** C.A.M., Ind. Sem. Horti Petrop. I (1835) 34; Miscz. in Fl. cauc. crit. II (1912) 92–94; Grossg., Fl. Kavk. I, 189.— Bulbocodium hastulatum Friv. in Reg. Flora (1836) 434.— Colchicum soboliferum Stef., Monogr. Gatt. Colchicum (1926) 44.

Perennial, 8–20 cm tall; corm ca. 1 cm, covered with delicate brown tunics, attached to a horizontal or oblique stalk with numerous soboles; leaves 3, linear-lanceolate, acuminate, more or less flattened, delicate, distinctly nerved, glabrous, 3–5 mm broad, appearing together with flowers and usually exceeding them; flowers 1 or 2, pink; perianth segments with a linear-elliptic obtusish limb, 17–25 mm long, 2.5 mm broad, sagittate at base by descending linear auricles, the filiform claws twice the length of limb; stamens half as long as the limb; anthers 2–3 mm long, ellipsoid, brown, versatile; capsule small, ovoid-oblong, to 18 mm long. January-March. (Plate II, Figure 1a).

Alpine meadows, at altitudes of 2100–2400 m.— Centr. Asia: Mtn. Turkm., Pam.-Al. (E. Bal'dzhuan); Caucasus: E. Transc. **Gen. distr.**: Bal.-As. Min., Iran. Described from Khoi area in Iranian Azerbaijan. Type in Leningrad.

2. **M. Raddeana** Rgl. Gartenfl. (1881) 293; Miscz. Fl. cauc.-crit. II (1912) 94–95; Grossg., Fl. Kavk. I (1928) 189.— C. caucasicum v. Raddeanus (Rgl.) Stef., Monogr. Gatt. Colchicum (1926) 44.— Ic.: Rgl. Gartenfl. t. 1057, t. 1.

Perennial, 7–13 cm tall; corms small, ovaloid, with delicate submembranous cinnamon-brown tunics; stem lateral; leaves linear-
17 lanceolate to lanceolate, 4–12 mm broad, subobtuse; perianth pale pink, drying pale violet; limb of perianth linear-elliptic, obtusish, to 6 mm broad, always with long mostly filiform teeth at base; stamens half as long as the limb; anthers yellow, oblong, 2 mm long, 3 times the length of filament. Fl. March-April.

Alpine meadows, mountain slopes and passes, near the snowline, at altitudes of 2400–3170 m.— Caucasus: S. Transc. (Nakhichevan, Lake Gokcha area), Talysh. **Gen. distr.**: N. Iran. Described from Sabalan and Khorzan Pass near Qazvin. Type in Leningrad.

3. M. **hissarica** Rgl. in A.H.P. VIII (1884) 645.— Colchicum hissaricum Stef., Monogr. (1926) 23.

Perennial, up to 10 cm tall; corms medium size, 2–3 cm long, 1–1.5 cm broad, oblong, the brown membranous tunics slightly exceeding the corm; leaves 2, oblong-lanceolate, 8–10 mm broad, canaliculate, nearly flat, subfalcate, rarely straight, spreading, obtuse, smooth-margined, shorter than or rarely equaling to slightly exceeding the flower; flowers solitary, white; limb of perianth segments oblong, obtuse, 1.5–2 cm long, 3–5 mm broad, exauriculate, the filiform claw 1.5–2 times the length of limb; anthers yellow, narrowly linear, 8 mm long, twice the length of filament, one-third shorter than the limb; ovary oblong; style filiform, slightly exceeding the stamens; stigmas small, capitate. Fl. May, June, July.

Mountains in the alpine zone, passes near the snowline, at altitudes of 2400–4000 m.— Centr. Asia: Pam.-Al., T. Sh. Endemic. Described from Pam.-Al. (Mura Pass). Type in Leningrad.

4. **M. trigyna** (Adams) Woron. in Schedis ad Fl. cauc. exs. in A.H.P. XXVIII (1912) 431; Grossg., Fl. Kavk. I, 190. — Bulbocodium trigynum Adams in Web. et Mohr. Beitr. z. Natrk. I (1805) 49; Ldb. Fl. Ross. IV, 205. — M. caucasica M.B. Fl. taur.-cauc. II (1808) 293, 426 et III (1819) 281; Miscz. in Fl. cauc.-crit. II (1912) 95-97. — Bulbocodium caucasicum Shmal'g., Fl. II (1897) 511. — C. caucasicum Spreng. Stef. Monogr, (1926) 43-44. — Merendera caucasica v. euryphylla Bordz. in Herb. — Ic.: M.B. Cent. pl. rar. ross. I (1810) t. 50; Bot. Mag. (1839) t. 3690. — Exs.: Fl. cauc. exs. No. 258. Pl. or. exs. No. 28.

Perennial, 8-12 cm tall; corm ovoid, 1-2 cm long, 1-1.5 cm in diameter, clothed in short rigid blackish-brown tunics, stems arising from the center of the corm; leaves 2-4, linear-lanceolate, 3-4 mm long (after flowering to 1 cm broad), canaliculate, falcate, acuminate, thickish, glabrous, shorter than to about equaling the flower at anthesis; spathe long, equaling the perianth tube; flowers 1-5, commonly pink, the color varying greatly in intensity from dark to pale pink, rarely whitish; perianth
18 segments oblong-lanceolate, 2-2.5 cm long, 5-7 mm broad, the teeth at the base of limb short or absent or sometimes the limb with a single tooth; limb 2-3 times as long as the filiform claw; anthers ovoid, versatile, 1.5-2 mm long; capsule oblong-ellipsoid, pointed at both ends. Fl. January-April.

Dry mountain slopes, at altitudes of 1500-1800 m and in plains. — Caucasus: W., E. and S. Transc. **Gen. distr,**: Arm.-Kurd., Asia Minor, N. Persia. Described from E. Transcaucasia — "hab. in Cauc. circa. castellum Georgo-politanum et in Iberia merid." Type in Leningrad.

5. **M. Eichleri** (Rgl.) Boiss. Fl. Or. V (1884) 168; Grossg., Fl. Kavk. I, 190. — Bulbocodium Eichleri Rgl. Gartenfl. XXVII (1878) 294 et in A.H.P. V, 633. — M. caucasica var. Eichleri Baker in Journ. Linn. Soc. XVII (1879) 439. — Bulbocodium caucasicum Shmal'g., Fl. II (1897) 511 p.p. — M. caucasica var. Eichleri (Rgl.) Baker in Miscz. Fl. cauc. crit. II (1912) 97. — Colchicum caucasicum Spreng. Stef. Monogr. Gatt. Colchicum (1926) 43. — Ic.: Rgl. Gartenfl, (1878) t. 952.

Perennial; corm ovoid-oblong, larger than in the preceding species, 1.5-2.5 cm across, with blackish-brown stiff tunics; spathe very short; stems short; leaves 8-18 mm broad, linear-ovate, canaliculate, acuminate, greatly exceeding the flower already at anthesis; flowers commonly white or faintly rose; perianth segments mostly acuminate, with short teeth at the base of limb; claw 3 times the length of limb; stamens shorter than the limb; anthers with sagittate appendages. March-April.

Wet mountain slopes, 600-1800 m. — Caucasus: Cisc. (Kislovodsk, Pyatigorsk), Dag., E. Trans. Endemic. Described from vicinity of Baku according to Eichler's collections.

6.* **M. candidissima** Miscz. ex Grossh., Fl. Kavk. I (1928) 190.

Perennial; corm with numerous stiff coarse black tunics; stem usually central; leaves sublanceolate, obtuse, lustrous, bright green, shorter than to equaling the flower; perianth white, rarely dingy white.

* This species was referred by E.G. Chernyakovskaya, to M. trigyna Woron. as a synonym, and has been included by the editors in the manuscript.

Caucasus: Tal. Endemic. Described from Zuvant. Type in Tiflis [Tbilisi].

Note. We do not have at our disposal either full description or herbarium material. The species is included in the "Flora" solely for the sake of a full inventory and in consideration of the fact that the endemism for Talysh is beyond doubt. Hence the importance of this species which is related to the two preceding ones within the general system of the genus Merendera.

7. **M. robusta** Bge. in Mém. Sav. Etr. Pétersb. VII (1854) 515; Boiss. Fl. Or., V, 169. — Bulbocodium robustum Rgl. in A.H.P. VI (1879) 491. — B. persicum β turkestanicum Rgl. in Gartenfl. XXX (1881)
19 294. — Merendera Badghysi Korsh. in Mém. Ac. Pétersb. VIII, IV, No.4 (1896) 99. — Colchivum robustum Stef., Monogr. (1926) 24. — Ic.: Gartenfl. XXX (1881) t. 1508. Opred. rast. okr. Tashk. (1923), Figure 89. — Exs.: HFR, No.156.

Perennial; corm large, ovoid-oblong, flattened, 2, 3–4 cm across, clothed in coriaceous blackish-brown tunics prolonged into a long tube enveloping the base of stem; leaves 3–6, appearing together with and somewhat exceeding the flowers, linear to linear-lanceolate, 1–2.5 cm broad, slightly spreading, glabrous, with a cartilaginous softly scabrous margin, acuminate, many-nerved, the lowest leaf sometimes subdistant; flowers 2 or 3 (-8), white or pink; limb of perianth segments oblong-elliptic, 25–30 mm long, 5–6 mm broad, exauriculate; claws narrowly linear to subfiliform, 2–3 times the length of limb; stamens about half the length of limb; anthers linear, greenish-yellow, 6–10 mm long, 3–4 times the length of filament, basifixed; capsule oblong, 2–3 cm long, the fruitlets short-beaked; seeds 20–40, globose. February-March. (Plate II, Figure 2 a, c).

Sandy and sandy-clayey hills; sands and sandy-clayey and solonchak plains. — Centr. Asia: Mtn. Turkm., Kara K., Kyz. K., Pam.-Al., Amu D., Syr D., Balkh. (Chu). **Gen. distr.**: India, Baluchistan. Afghanistan, Described from the sands of Syr D. and Kyz. K. Type in Leningrad.

Note. The following observations were made by A.I. Vvedenskii on a large number of plants (more than 150 specimens) grown in the Botanical Garden of Tashkent from corms collected near Kushka: Flower white at first, gradually turning pink, rarely pale pink to start with. Limb of perianth variable in size and shape. Measurements of a large number of specimens gave the following petal dimensions: 25×6, 35×11, and 40×9 mm, the outer segments somewhat broader and longer; all acute or obtuse. Similar observations were carried out on M. Jolantae E. Czerniak, in which the dimensions fluctuated within the range 15 × 5 mm to 18×3 mm.

8. **M. Jolantae** E. Czerniak. in Bull. Jard. Bot. Princ. XXIX (1930) 193.

Perennial, 13–15 cm tall in flower, up to 30 cm in fruit; corm oblong-ovoid, 2–2.5 cm broad, clothed in thin dark cinnamon-brown tunics prolonged into a short tube enveloping the stem; spathe pale membranous, obliquely truncate; leaves 3–5–(10), narrowly oblong-lanceolate, coriaceous, canaliculate, slightly attenuate, subobtuse, 4–12 mm broad,

glaucescent, glabrous, scaberulous-margined, developing together with and somewhat shorter than the flowers; flowers 1–3, white; limb of
20 perianth segments linear-lanceolate, obtusish, 20–25 mm long, 4–6 mm broad, exauriculate, the linear-filiform claw twice the length of limb; stamens about half the length of limb; anthers linear, basifixed, 8–9 mm, long, 2–3 times the length of filament; filaments white, 3–4 mm long; capsule ca. 1.5 cm long, the valves long-beaked. March, in mountains June. (Plate II, Figure 3).

Clayey slopes and gypseous hills. — Centr. Asia: Mtn. Turkm. Endemic. Described from Kopet Dagh from Razarash. Type in Leningrad.

Genus 259. **BULBOCODIUM*** L.**

L. Coroll. Gen. (1737) 6.

Perianth petaloid, large, 6-parted; segments distinct, the long narrow claws forming a tube and joined by teeth on either side of limb base; stamens inserted at limb base; filaments slender; anthers versatile; pistil with 1 sessile trilocular many-ovuled ovary and 1 apically 3-fid style; capsule oblong, 3-valved; seeds globose. Tuberous plants.

1. **B. versicolor** (Ker.-Gawl.) Spreng. Syst. veg. II (1825) 40. — Colchicum versicolor Ker.-Gawl. Bot. Reg. (1821) t. 571. — Bulbocodium vernum M. B. Fl. taur.-cauc. I (1808) 261. — B. ruthenicum Bge. Ind. Sem. H. Dorp. 12 (1837) 11; Ldb. Fl. Ross. IV, 206; Shmal'g., Fl. II, 511. — Ic.: Rchb. Ic. Fl. Germ. t. 955; Fl. Yugo-Vost. III (1929) 376, Figure 173.

Perennial; tuber ovoid, 1–1.5 cm in diameter, with dark brown membranous tunics; leaves 3–4, with flowers, lance-linear, not more than 1 cm broad, upright, subobtuse, canaliculate, glaucous, glabrous, elongated after flowering; flowers pink or pinkish-lilac, obtusish, 2.5–3 cm long, the limb barely longer than the narrow claw, with a pair of obtuse auricles at base; stamens one-third to half the length of limb;
23 anthers yellow, oblong; capsule 15–17 mm long, oblong, acuminate; style long, 3-fid at the top. Fl. March-April. (Plate II, Figure 6, a).

Steppes, slopes, commons, scrub, woods, wet glades, and water meadows. In the USSR in the steppe regions. — European part: M. Dnp., V.-Don, Trans., Bl., L. V. For the Caucasus there are only literary records (Boiss. Fl. Or. V, 170; Mishchenko in Fl. cauc. crit. II, 1912, 102; Grossg., Fl. Kavk. I (1928) 190). — Cisc. and Dag. **Gen. distr.**: W. and E. Med. Described from S. Russia.

* From Greek bolbos, tuber, and kodion, membrane, referring to membranes of the tunic covering the tuber.

** Arranged by E.G. Chernyakovskaya.

Plate II

1. Merendera sobolifera C.A.M.: 1a) perianth segments.– 2. M. robusta Bge.: 2a) fruit; 2b) perianth.– 3. M. Jolantae E. Czern., perianth segments.– 4. Colchicum Szovitsii C.A.M., perianth segments.– 5. C. nivale Boiss. et Huet., flower.– 6. Bulbocodium versicolor Spreng, flower; 6a) fruit.– 7. Colchicum serpentinum Woron., 7a) fruit; 7b) perianth segments; 7c) style and stamens.– 8. C. umbrosum Stev.

Genus 260. **COLCHICUM*** (TOURN.) L.**

Colchicum (Tourn. Inst. 346, t.181, 182); L. Gen. pl. ed. I (1737) 107; ed. 5 (1754) 159.– Synsiphon Rgl. in A.H.P. VII (1879) 490.

Flowers and leaves inclosed in a spathe; flowers large, bisexual; perianth infundibular-campanulate, with a long cylindric tube and 6-parted limb; stamens shorter than perianth segments, the 3 inner shorter than the outer, all inserted in perianth throat; style 1, with 3 distinct styles; stigmas clavate; ovary trilocular; fruit an ovoid-globose to ovoid-oblong septicidal capsule; stems numerous; bulbs coated with brown sheaths (tunics) prolonged into a fairly long tube enveloping the lower part.

Note. Colchicum species are poisonous and infest pastures (Fedch., Rast. Turk. 221). The seeds (Semen Colchici) have medicinal value. Nearly all species deserve a place in gardens for their decorative flowers.

1. Flowers and leaves appearing together in spring . . . . . 2.
+ Flowers appearing in fall; leaves and capsules in the spring of the following year . . . . . 8.
2. Leaf margin rough-ciliate; filaments sometimes villous at base. . . . . 1. **C. Biebersteinii** Rouy.
+ Leaf margin always smooth; filaments never villous . . . . . 3.
3. Bulbs small, 1–2 cm long, more or less cylindric. . . . . 4.
+ Bulbs larger, thickened at base . . . . . 5.
4. Bulbs subcylindric, the tunics thin and delicate, the outer brown, the inner reddish-brown, lustrous; leaves 3, narrowly linear, canaliculate, 2–4 mm broad; flowers 1–4, pale pink; perianth segments oblong-lanceolate, 2–2.5 cm long, with a very slender tube; anthers small (2 mm long), linear, drying blackish-green— filaments 4–5 times the length of anther . . . . . 2. **C. serpentinum** (Woron.) Miscz.
+ Bulbs oblong, 1.5 cm long, 1 cm in diameter, with coriaceous cinnamon-brown tunics; leaves 2, very rarely 3, short-lanceolate, subobtuse to obtuse, 4–15 mm broad, canaliculate at flowering, at length broadly elliptic, 15–20 mm long, 6–9 mm broad, twice the length of stamens; anthers 2–3 mm long, yellow; filaments 2–3 times the length of anther . . . . . 3. **C. nivale** Boiss. et Huet.
5. Flowers pink or violet; rarely white and then perianth segments narrowly linear . . . . . 6.
+ Flowers yellow or white, with a blackish-violet stripe on the black. . . 7.
6. Bulbs large, to 3 cm in diameter, with blackish-brown tunics; leaves 2–3, broadly lanceolate, to 2 cm broad; flowers pink; perianth segments elliptic-oblanceolate, obtusish, 2.5–3 cm long, 8–10 mm broad, with a short thick tube . . . . . 4. **C. Szovitsii** Fisch. et Mey.
+ Bulb 2.5 cm in diameter; leaves 1–3, narrowly linear; perianth segments ca. 2 cm long, narrowly linear, whitish, the tube slender. . . . . 5. **C. zangezurum** Grossh.

* A generic name derived from Greek Kolkhis (a region by the Black Sea, ancient Colchis), where this plant is very common. The Russian name of the genus, Osennik, alludes to some of the species which flower in late fall; their ovary winters and then develops into mature capsule with the appearance of leaves [From Russian osen, fall].

** Arranged by E.G. Chernyakovskaya.

7. Leaves 2–7, linear, scarcely developed at flowering time, 3–10 mm broad; flowers 1–4, mostly 1 or 2; perianth segments lance-oblong, obtuse, 1.5–2.5 cm long, 5 mm broad; anthers basifixed, narrowly linear, 9–10 mm long, 3 times the length of filament . . . . . 6. **C. Regelii** Stef.

\+ Leaves 3–4, lanceolate, canaliculate to nearly flat, 8–10 mm broad; flowers 1–3; perianth segments 1.5–2.5 (3) cm long, 5–7 mm broad, linear-oblanceolate, obtuse; anthers yellow, erect, narrowly linear, many times the length of filament . . . . . 7. **C. luteum** Baker.

8. Flowers 1–5, small; leaves 3–5, thickish, lance-lorate, obtuse, 15–22 mm broad; bulbs medium size, 1.5–2 cm in diameter, subglobose, the blackish coats prolonged into a long thin tube . . . . . 8. C. umbrosum Stev.

\+ Flowers and bulbs larger . . . . . 9.

9. Flowers pale lilac, medium size (fairly large); styles very slender, subfiliform, but slightly attenuate upward, many times the length of stamens; bulb to 3 cm in diameter, ovoid, fairly large, the coriaceous blackish-brown tunics prolonged into a long slender tube . . . . . 9. C. laetum Stev.

\+ Flowers very large, pinkish-purple or violet; styles thick, straight at the top; bulb large, oblong, up to 5 cm long, 3–4 cm broad, the dark cinnamon-brown membranous to subcoriaceous tunics prolonged into a long and broad tube . . . . . 10. **C. speciosum** Stev.

1. **C. Biebersteinii** Rouy in Bull. Soc. Bot. France LII (1905) 646; Stef. Monogr. Gatt. Colchicum (1926) 36–37; Vul'f., Fl. Kryma I, c, 3 (1930) 5–7. — C. bulbocodioides M. B. Fl. taur.-cauc. I (1808) 293, non Brot.; Stev. in Mém. Soc. nat. Moscou VII (1829) 267 p. p.; Shmal'g., Fl. II, 510. — C. montanum Ldb. Fl. Ross. IV (1853) 250 p. p.; Miscz. in Fl. cauc. crit. (1912) 111, non L. — Ic.: Stev. op. c. t. 16.

Perennial, 10–15 cm tall; bulb very small, 13–20 mm long, 1–1.5 cm in diameter, ovoid, the coriaceous tunics prolonged into a short neck; spathe long, membranous; leaves commonly 3, recurved, linear-lanceolate, canaliculate, more or less rough-margined, ciliate or glabrous, often narrowly cartilaginous-bordered, 4–8 mm broad; flowers 1–8, pinkish-violet, medium size; perianth 18–24 mm long, oblong-elliptic, obtusish, 10–15-nerved, the slender tube many times longer than the limb; stamens about half the length of perianth; filaments thickened toward base, often tomentose; anthers violet-brown, oblong-linear; styles straight, with terminal stigma; capsule globose, 12–18 mm long, short-acuminate. January-March.

Slopes and steppes, in clay soils. — European part: Bl., Crim. **Gen. distr.**: Asia Minor, France, Bulgaria, Dobruja.

2. **C. serpentinum** Miscz. in Fl. cauc. crit. II (1912) 114.

Perennial, 11–13 cm tall, flowering with leaves; bulbs small, 1–2 cm long, 5–8 mm in diameter, subcylindric; tunics short, thin, membranous, brownish-cinnamon-colored; leaves 2–3, narrowly linear, 2–4 mm broad, slightly recurved, canaliculate, strongly recurved to contorted after flowering; spathe long, pale, membranous, obliquely truncate; flowers 1–4,

pale pink; perianth segments 2 (2.5) cm long, oblong-lanceolate, the very slender tube 3–4 times the length of perianth; stamens half as long as the perianth; filaments thickened at base, gradually attenuate, orange, drying pale pinkish-violet; anthers 2 mm long, linear, drying blackish-green, the filaments 4–5 times as long as anthers; styles exceeding the stamens, filiform, straight. January-February. (Plate II, Figure 7, a-e).

Mountain slopes, among shrubs. — Caucasus: W. Transc. Endemic.
26 Described from former Artvin District of Batumi Region, where it occurs on slopes above the Lomashenskii nursery. Gen. distr.: Asia Minor. Type in Leningrad.

3. **C. nivale** Boiss. et Huet ex Stef. Monogr. (1926) 35–36. — C. Szovitsii var. nivale Boiss. et Huet in Boiss. Diagn. pl. sér. II, 4 (1859) 122 — Merendera nivalis Stapf in Denkschr. Akad. Wien I (1885) 18. — C. bifolium Frey et Sint. in Bull. Herb. Boiss. IV (1896) 198.—C. Szovitsii var. bifolium Bordz. in Acta Horti Tifl. XVIII, 2 (1919) 489.

Perennial; bulb small, oblong, 1.5 cm long, 1 cm broad, with short, coriaceous, cinnamon-brown tunics; spathe short, membranous, ovately truncate, colored; leaves 2 or rarely 3, short-lanceolate, obtusish to acutish, 4–15 mm broad, subcanaliculate in flower, at length broadly linear and subexplanate, glabrous, cartilaginous-margined; flowers solitary or rarely 2, pinkish or white; perianth segments broadly elliptic, the outer sometimes auriculate at base, 15–20 mm long, 6–9 mm broad, 7–15-nerved, obtusish, twice the length of stamens, the thick tube 3–4 times as long as perianth; filaments subulate, with thickened orange base; anthers 2–3 mm long; yellow; filaments 2–3 times as long as anthers; styles straight, with capitate stigma; capsule oblong, 15 mm long. March-May. (Plate II, Figure 5).

Alpine meadows, up to 300 m, on thawed snow patches. — Caucasus: S. Transc. Gen. distr.: Turkish Armenia and NW. Iran. Described from Turkish Armenia. Type in Geneva.

4. **C. Szovitsii** Fisch. et Mey. in Index Sem. Petrop. (1835) 24; Ldb. Fl. Ross. IV, 205; Miscz. in Fl. cauc. crit. II (1912) 112–114; Stef. Monogr. (1926) 25–27.

Perennial, 22 cm tall in flower; bulb fairly large, to 3 cm in diameter, the coriaceous cinnamon-brown tunics prolonged into a long tube; leaves 2 or 3, to 2 cm broad, suberect, with a flat or sometimes undulate glabrous margin; flowers with leaves, 1–4, whitish-pink; perianth segment obtusish, elliptic-lanceolate, 2.5-3 cm long, 8–10 mm broad, 9- or 10-nerved, the stout tube 4 times as long as the segments; stamens 7–10 mm long, one-third the length of perianth segments, thickened at base; anthers ellipsoid, 3 mm long, yellow; filaments glabrous; styles straight; capsule ovoid, large, 3.5–4 cm long; fruitlets long-beaked. March-April. (Plate II, Figure 4).

Subalpine and alpine meadows. — Caucasus: S. Transc., Tal. Gen. distr. N. Iran. Described in 1829 from Somkhetiya, Arekligeduk mountains, from collection of Shovits. Type in Leningrad.

5. **C. zangezurum** Grossh., Fl. Kavk. I (1928) 191.

27 Perennial; bulb large, to 2.5 cm in diameter; tunics coarse, blackish-brown; leaves 1–3, narrowly linear; flowers 1 or 2, slender-tubed; perianth segments to 2 cm long, narrowly linear, whitish.

Caucasus: S. Transc. Endemic. Described by A. A. Grossheim from live specimens grown from bulbs collected in Zangezur, on dry mounds in Araks Valley.

Note. Not having seen the specimens, we doubt the distinctiveness of this species. It is not known whether the type plant still exists. Stefanov refers it conjecturally to C. nivalis.

6. **C. Regelii** Stef. in Monogr. Gatt. Colchicum (1926) 22–23.— Synsiphon crociflorum Rgl., A.H.P. IV (1879) 491.— C. crociflorum Rgl., A.H.P. VII (1880) 385, non Schott. et Kotschy (1854).— C. crociflorum var. typicum et var. stenophyllum Rgl. in A.H.P. VIII (1884) 646.— C. Kesselringii Rgl. A.H.P. VIII (1883) 646.— Ic.: Bot. Mag. t. 8055; Opred. rast. okr. Tashk. I (1923), Figure 90.

Perennial; bulb ovoid-oblong, 1–3 cm long, 1.5–2 cm in diameter, the blackish-brown membranous to subcoriaceous tunics prolonged into a rather long tube; leaves 2–7, linear, appearing with flower, scarcely developed or rather short in flower, spreading, canaliculate, subobtuse to subacute, at length lance-linear, flat, subcoriaceous, 3–10 mm broad, the margin smooth or rarely denticulate; flowers 1–4, mostly 1 or 2; perianth segments oblong-lanceolate, obtuse, 1.5–2.5 cm long, 5 mm broad, white, with a blackish-violet dorsal stripe, twice as long as stamens, the tube to 10 cm long, more or less violet-tinged; anthers yellow, basifixed, narrowly linear, 9–10 mm long, twice the length of filaments. February-May (July).

Mountains, from 2000 to 3800 m, in mountain passes of the alpine and subalpine zones, descending onto mounds in the foothills and submontane plains.— Centr. Asia: Syr D. (Tashkent, Chirchik Valley), Pam.-Al., T. Sh. Endemic. Described from the vicinity of Tashkent. Type in Leningrad.

Note. Regel (l.c.) notes two varieties: α typicum — many-flowered forms with lance-oblong perianth segments (Chu and Narym river valleys) and β stenosepalum — a 1- or rarely 2-flowered form with sublinear segments. (E. Bukhara, Darvaz).

7. **C. luteum** Baker in Gard. Chron. VII (1874) 34; Stef. Monogr. (1926) 21–22.— C. Alberti Rgl. in A.H.P. VIII (1883) 647.— Ic.: Bot. Mag. t. 6153; Fedch., Rast. Turk. (1914) 220, Figure 152.— Exs.: Herb. Fl. As. med. No. 51.

Perennial; bulb ovoid-oblong, flattened, 1.5–3 cm long, 1–2.5 cm broad, the brownish membranous tunics mostly prolonged into a tube 5–10 cm long enveloping the lower part of the stem; leaves (2) 3–4, short and
28 canaliculate at flowering time, at length linear-ligulate, to 15 cm long, 8–15 mm broad, subobtuse, glabrous-margined; flowers 1–3, yellow with leaves, the yellowish or violet tube 3–7 mm long; perianth segments 1.5–2.6 (3) cm long, 5–7 mm broad, erect, bright yellow, unicolor or dorsally violet-tinged at base, linear-oblanceolate, obtusish; anthers

yellow, basifixed, narrowly linear, many times the length of filament; styles filiform, yellow; capsule ovoid, to $2\frac{1}{2}$ cm long; fruitlets long-acuminate. Fl. April-July.

Near thawing snow, in mountains and on glaciers, at 1800 to 4000 m. — Centr. Asia: Pam.-Al., W. Tien. Shan. Gen. distr.: Tibet, India, Baluchistan, Afghanistan. Described from Kashgar (Yarkend).

Note. Two-leaved 1-flowered forms of W. Tien Shan (Narym River valley) were separated by A. Regel into a distinct species, C. Alberti Rgl. (A. H. P. VIII, 647). This species differs little from the type; similar 2-leaved and 1-flowered forms occur, side by side with typical plants, in others areas (Zeravshan valley, former Namangan County, E. part of Tadzhik SSR). The Darvaz forms differ to some extent in having broader leaves (up to 2 cm broad), larger bulbs and broader perianth segments.

Note. This plant is considered as poisonous and dangerous to cattle in Kirghizian pastures.

8. C. **umbrosum** Stev. in Nouv. Mém. Soc. Nat. de Moscou I (1829) 268; Ldb. Fl. Ross. IV, 204; Shmal'g., Fl. II, 510; Miscz. Fl. cauc. crit. II (1912) 109; Stef. Monogr. (1926) 64. — C. autumnale M. B. Fl. taur.-cauc. I (1808) 292, non L. — Ic.: Stev. op. cit. t. 14. — Exs.: Herb. Fl. cauc. No. 162; Fl. cauc. exs. No. 355.

Perennial, 11–15 cm tall in flower, 20–28 cm in fruit; bulb medium size, 1.5–2 cm in diameter, subglobose, somewhat asymmetrical at base; tunics blackish, membranous, prolonged into a slender tube; leaves 3–5, rather thick, lance-lorate, obtuse, 15 cm long, 15–22 mm broad; flowers 1–5, small, appearing in fall; perianth segments elliptic-oblanceolate, lilac or pale purple, to 2 cm or rarely 2.5–3 cm long, the tube 5–6 times the length of the limb; stamens less than half the length of perianth; anthers yellow, hyaline-margined; style barely exceeding or rarely equaling the stamens, slightly curved at the top; mature capsule ellipsoid-oblong, to 4 cm long, acuminate, narrowed toward base. Fl. August-September; fr. April-May (Plate II, Figure 8).

Foothills and mountains, in the subalpine and timber zones, shady meadows, under trees, glades among shrubs, and mountain slopes. — European part: Crim; Caucasus: Cisc., W. Transc., Dag. Gen. distr.: Asia Minor. Described from the vicinity of Yalta. Type in Helsinki.

29 9. C. laetum Stev. in Nouv. Mém. Soc. Nat. Moscou VII (1829) 262, separat. p. 66; Ldb. Fl. Ross. IV, 204; Shmal'g., Fl. II, 510; Miscz. in Fl. cauc.-Crit. II (1912) 110–111; Stef. Monogr. (1926) 65. — C. autumnale M. B. Fl. taur.-cauc. I (1808) 293 (quoad pl. cauc.). — Ic.: Stev. op. cit. t. 13; Rgl., Gartenfl. (1862) t. 379.

Perennial; bulb ovoid, fairly large, ca. 3 cm in diameter; tunics coriaceous, blackish-brown, prolonged into a fairly long slender tube; leaves 4, ligulate, pale green, the lowest subobtuse, broader than the others, the upper acute; flowers 1–3, fairly large, pale lilac or purple; perianth segments lanceolate to elliptic; commonly up to 4 cm long, obtuse, the throat glabrous, the tube 3–4 times the length of limb; stamens about half the length of perianth segments; anthers linear, yellow, to 6–8 cm long; styles very slender, linear, nearly straight, slightly thicker and scarcely curved at the top, many times the length of stamens; capsule ovoid,

to 2 cm long, borne on a very short stipe, obtuse at base, acuminate at the top. Fl. August-September; fr. April.

Meadows and steppes. — European part: L. V., L. Don; Caucasus: Steppe parts of Cis., Dag. Endemic. Described from the Caucasus (In campis ad Terek circa Casaccorum oppidum). Type in Helsinki; cotype in Leningrad.

10. **C. speciosum** Stev. in Nouv. Mém. Soc. Nat. Moscou VII (1829) 265; Ldb. Fl. Ross. IV, 204, p.p.; Miscz. in Fl. cauc. crit. II (1912) 106; Stef. Monogr. (1926) 80. — C. speciosum var. lenkoranicum Miscz. l.c., 108. — C. lenkoranicum Grossh., Fl. Kavk. I (1928) 191. — C. hyrcanicum Woron. in Schedis ad Herb. Fl. Cauc. (1914) 62. — Ic.: Bot, Mag. t. 6078. Stev. op. cit. t. 15. — Exs.: HFR. No. 841; Fl. cauc. exs. No. 276; Pl. or. exs. (1928) No. 328; Herb. Fl. cauc. No. 161.

Perennial, 20–60 cm tall; bulb large, oblong, to 5 cm long and 3–4 cm broad, the dark cinnamon-brown membranous to subcoriaceous tunics prolonged into a long and broad tube enveloping the lower part of stem; stems leafy in fall; leaves 4, broadly oblong, subobtuse, 18–25 cm long, 3.5 cm broad, the lower larger, ovate, to 7 cm broad, the long sheath clasping the stem; flowers 1–3, rarely 4, very large, the tube broad; perianth segments 5–6.5 cm long, 15–22 mm broad, broadly oval to elliptic, obtusish, pinkish-purple to violet, glandular in throat; stamens about half the length of perianth segments; anthers linear, 8–12 mm long, yellow; style exceeding the stamens, straight at the top; stigma unilateral; capsule ellipsoid, to 3 cm long. Fl. August-October; fr. June-July.

Subalpine woods, gullies, mountain slopes, wood margins, and meadows, ay 1800–3000 m. — Caucasus: Cisc., W. and E. Transc., Tal. **Gen. distr.**: Turkish Lazistan, N. Persia. Described from Transcaucasia (Iberia, Steven). Type in Helsinki and in Leningrad.

30 Note. The Lenkoran type, recorded by Mishchenko as a variety (var. lenkoranicum Miscz.), differs insignificantly from the typical species C. speciosum Stev. The differences reported, such as the larger flowers and perianth segments to 7 cm long, as well as the larger bulb, are not enough to establish a distinct species, as in the typical species both flowers and bulbs range in size from small to large. The typical form is not confined to Talysh, but spreads over the whole of N. Persia, and thus the claim of independent standing for the Lenkoran form is unjustified. This claim is further weakened by the fact that Yu. N. Voronov considered the Persian and Talysh Colchicum as a new species, C. hyrcanicum Woron., although he gave no description of it.

As regards Abkhazian material (especially from Tsebel'da Valley), it differs to such an extent that, on the basis of drawings made from live material collected in the Tsebel'da district, the late Yu. N. Voronov set it up as a distinct species, C. liparochiadys Woron. A characteristic feature of this species is the obcordate bulb, 5 cm long and 3.5–4 cm broad, borne on an obtusely rostrate offshoot, the thin membranous cinnamon-brown lustrous tunics prolonged into a tube 3–3.5 cm long terminating in a spinose tooth; flowers 2–3–4, relatively small, the narrow perianth segments 3–5 cm long and the tube relatively slender; anthers linear, 6 mm long. F. August-September-October.

Woods. — Caucasus: W. Transc., Abkhazia, Tsebel'da, Amtkel natural boundary and Umur, near Chisshir, at 1800 m; Yur'evskoe.

* C. autumnale L. Sp. pl. (1753) 485; Ldb. Fl. Ross. IV, 204; Shmal'g., Fl. II, 510. — Ic.: Rchb. Ic. Fl. Germ. I, 66.

Perennial; bulb to 3 cm in diameter, the blackish-brown tunics prolonged into a long tube; flowers in fall, in larger number; perianth segments lilac-rose, elliptic, obtuse, tomentose within; styles half the length of perianth segments, recurved, the lateral stigmas decurrent; leaves 3 or 4, linear-lanceolate, flat, erect, to 30 cm long.

Wet meadows. — Gen. distr.: Outside USSR: W. Poland, Lithuania, Volhynia.

Note. The specimen from the Prichernomorskii District, Kherson area, which appears in the Russian herbarium as C. autumnale L. is none other than C. umbrosum Stev. More promising is Besser's report for the [former] Ovruch Country in Volhynia.

Subfamily 2. **Asphodeloideae** VENT.

Rootstock giving rise to radical leaves and a scape; inflorescence a terminal raceme; anthers introrse; tip of filament intruding into a pit on the outer or inner side of anther; capsule loculicidal. Asphodeline, the only genus with a leafy stem, is also characterized by jointed pedicels.

31 Key to Genera

1. Flowers infundibular or campanulate . . . . . 2.
+ Flowers rotate or the lower part of perianth segments united into a tube. . . . . 3.
2. Stems leafy; stamens unequal, the three inner ones longer and fertile; capsule often with 1-seeded cells . . . . . 261. **Asphodeline** Rchb.
+ Stems leafless; stamens equal; seeds at least 6 in each cell . . . . . 262. **Eremurus** M.B.
3. Flowers rotate, in a branched often paniculate inflorescence . . . . . 263. **Anthericum** L.
+ Flowers infundibular, more or less tubular at base, in a short terminal raceme, or 1–8 large flowers opening in succession . . . . . 4.
4. Flowers blue, lilac or white; leaves distinctly petiolate . . . . . 264. **Funkia** Spreng.
+ Flowers yellow or orange; leaves broadly linear, sessile . . . . . 265. **Heremocallis** L.

Genus 261. **ASPHODELINE*** RCHB.**

Rchb. Fl. Germ. Excurs. (1830) 116.

Flowers white or yellow, in rather dense racemes; pedicels twin or ternate, jointed at the middle; bracts membranous; perianth segments oblong-lanceolate or elliptic, connate at base into a short tube, spreading,

* Asphodel-like in Greek; asphodel, meaning free from want, was the name of Asphodelus ramosus L., mentioned by the Greek authors Homer and Hesiod.

** Arranged by E.G. Chernyakovskaya.

1-nerved, the lowest relatively distant from the others, narrower and tapering at base; stamens inserted in perianth tube; filaments unequal, declined-ascending, dilated at base, concave, surrounding the ovary; ovary 3-locular, with 2 triquetrous ovules in each locule; style filiform; stigma very small, subcapitate; capsule coriaceous, the valves transversely grooved or rugose; seeds cuneate-triquetrous. Rhizomatose herbs with leafy stems; leaves numerous, linear-subulate, narrowly 3-angled, membranous sheathing at base. Ornamental flowering plants, deserving introduction into cultivation. Some of them, such as A. lutea, have long been grown in Europe.

1. Annual, 10–15 cm tall; stem nearly always branched above the middle; inflorescence a fairly loose, short 4–10-flowered raceme; flowers
32 white, small; perianth leaves 8 mm long; pedicels equal bracts. . . . . 1. A. **dendroides** (Hoffm.) G. Woron.

\+ Perennials . . . . . 2.

2. Flowers white, large, ca. 2 cm long; large plants, in a very dense tassellate raceme, the large silvery membranous bracts covering the flowers; leaves 1–2 mm broad; stem densely leafy up to the inflorescence . . . . . 2. A. taurica (Pall.) Kunth.

\+ Flowers yellow . . . . . 3.

3. Stem more or less uniformly leafy up to the inflorescence; leaves ca. 4 mm broad, 3-angled, the margin glabrous; raceme dense, long; flowers yellow, large, 2–2.5 cm long; bracts ovate, exceeding the pedicel; roots fleshy, thick . . . . . 3. A. lutea Rchb.

\+ Stem leafy only at base and not above the middle, leafless below the inflorescence . . . . . 4.

4. Stem leafy only at base; leaves thin, linear, rough-margined; raceme fairly loose; flowers pale yellow, large, ca. 2 cm long; perianth segments about as long as pedicels, narrowly linear . . . . . 4. A. tenuiflora (C. Koch) Miscz.

\+ Stem leafy one-third its length from base or up to the middle, conspicuously sulcate; leaves upright, subappressed, subulate, ca. 1 mm broad, crowded about the middle of stem; raceme loose; perianth 1.5–2 cm long, much longer than pedicel, yellow; perianth segments narrowly lanceolate, green-banded on the back . . . . . 5. A. tenuior (Fisch.) Ldb.

1. A. **dendroides** (Hoffm.) G. Woron. ex Grossh., Fl. Kavkaz. I (1928) 192. — Anthericum dendroides Hoffm. in Comment. Soc. phys. med. mosq. I (1802) 43. — Asphodelus prolifer M. B. Fl. taur.-cauc. (1808) 280 et III, 269. — Asphodeline prolifera Kunth Enum. IV (1843) 563; Ldb. Fl. Ross. IV, 193; Miscz. in Fl. cauc.-crit. II (1912) 124–125. — Ic.: Buxb. Cent. II, p. 34, t. 36. — Exs.: Herb. Fl. cauc. No. 57.

Annual; roots very thin, short, subvertical; stems 10–15 cm long, more or less branched above the middle, the upper part densely leafy, the lower part with few distant leaves; leaves linear-subulate, very thin, membranous-dilated at base, amplexicaul, finely membranous-margined; inflorescence branches longer than leaves; racemes loosely 4–10-flowered; bracts small, deltoid, subulately long-acuminate, hyaline-membranous; pedicels solitary or the lower ones twin, jointed at the middle, equaling

the bracts; stamens subequal, shorter than perianth; capsule small, ovoid-globose, 5 mm in diameter, slightly thickened at base; seeds very small,
33 elongate-triquetrous, ca. 4 mm long, 1.5 mm broad, furrowed, laterally concave, punctate. Fl. May. (Plate V, Figure 1).

Dry stony slopes, stony steppes, and as weed in fields. Caucasus: S. and E. Transc. Endemic. Described from Georgia. Type in Berlin.

2. A. **taurica** (Pall.) Kunth Enum. IV (1843) 561; Ldb. Fl. Ross. IV, 193; Shmal'g., Fl. II, 484; Miscz. in Fl. cauc.-crit. II (1912) 123. — Asphodelus tauricus Pall., Nova Acta Petrop. X (1792) 309. — Ic.: Redouté. Lil. t. 470; Gard. Chr. Ser. III, XXI (1897) 175. — Exs.: Fl. cauc. exs. No. 29.

Perennial; root fibers slender; stems stout, 40–60 cm long, simple; leaves densely covering the stem up to the inflorescence, linear-subulate, 1–2 mm broad, dilated at base, broadly hyaline-margined, amplexicaul; inflorescence a very dense simple raceme up to 25–30 cm long, made silvery by the large appressed ovate long-cuspidate hyaline bracts covering the flowers; pedicels thickened, the lower mostly ternate, jointed about the middle; flowers white; perianth segments oblanceolate-spatulate, ca. 2 cm long, white, brownish-green-banded; filaments unequal, three times the length of anther; capsule ovoid to subglobose, ca. 8–10 mm long, the valves flat obtusish rugose; seeds oblong-triquetrous, blackish, 5 mm long, 3 mm broad, 2 in each cell, with 3 dorsal grooves, punctate-papillose on the sides. Fl. May. (Plate III, Figure 1 a, b).

Dry stony exposed places in the subalpine and alpine zones, woody mountain slopes, passes and gullies. — European part: Crimea; Caucasus: W. Transc. (Novorossiisk); Cisc. and S. Transc. (Kuban). Gen. distr.: Bal.-As. Min. Described from Crimea. Type in Leningrad.

3. A. lutea (L.) Rchb. Fl. Germ. exsc. (1830) 116; Ldb. Fl. Ross. IV, 193; Shmal'g., Fl. II, 484; Miscz. in Fl. cauc.-crit. II (1912) 120. — Asphodelus luteus L. Sp. pl. (1753) 309. — Ic.: Rchb. Ic. Fl. Germ. X, t. 1121 (2848); Fedch. and Fler., Fl. Evr. Rossii (1910) 229, Figure 158. — Exs.: Fl. cauc. exs. No. 28.

Perennial; root fibers numerous, fleshy, thick, tufted; stem stout, up to 60–70 cm long, simple, leafy from base; leaves uniformly distributed right up to inflorescence, pugioniform, rather thick, 3-angled, ca. 4 mm broad, sulcate, imbricate, ascending, triangularly dilated at base into a membranous sheath, the margin smooth or almost imperceptibly roughened; raceme long, dense, elongate, simple; bracts shorter than flowers, ovate, hyaline, cuspidate, the cusp exceeding the pedicel; lower pedicels twin or in 5's, jointed at or below the middle, straight; flowers large, greenish-yellow, with a green nerve; perianth segments narrowly oblong-lanceolate,
34 ca. 2–2.5 cm long; capsule oblong-globose, large, to 12 cm long, the valves irregularly and coarsely rugose; seeds fairly large, tetrahedral, 6 mm in diameter, grayish-brown, with 2 dorsal grooves, minutely papillose on the dies, 2 in each cell. Fl. April-May (March). (Plate III, Figures 3 a, 3 b).

Stony mountain slopes, rocks, exposed places, woods and scrub, rarely steppes, at 700–1100 m. — European part: Crimea; Caucasus: W. and S. Transc. **Gen. distr.**: Med. and Bal.-As. Min. Described from Europe (Dalmatia and islands of the Adriatic).

4. **A. tenuiflora** (C. Koch) Miscz. in Fl. cauc.-crit. II (1912) 122.— Asphodelus tenuiflorus C. Koch in Linnaea XXII (1849) 261.— Asphodeline tenuior Ldb. Fl. Ross. IV, 193 (p.p., quoad pl. Kochian.).

Perennial; root fibers slender; stems 18 cm long, simple, slender, striate, leafy only at base; leaves very narrow, thin, setaceous, glaucescent, about reaching the first flower, dilated at base, the margin more or less roughened; raceme very loose, simple; bracts 1 cm long, lanceolate, long-acuminate; flowers pale yellow, the lower ternate, the others twin or solitary; perianth segments with a green nerve, ca. 2 cm long, slightly longer than pedicel, narrowly linear; immature capsule obconical, pointed. Fl. June.

Rocks, ca. 900 m. According to Mishchenko — Caucasus: S. Transc., Armenia and former Kars Region, Otlinskii District. Endemic. Described from Armenia. Type in Tiflis.

5. **A. tenuior** (Fisch.) Ldb. Fl. Ross. IV (1853) 193 (excl. syn. C. Kochii); Shmal'g., Fl. II, 484; Miscz. in Fl. cauc.-crit. II (1912) 121.— Asphodelus tenuior Fisch. Cat. pl. h. Gorenk. p.a. 1812, 9.— Ic.: Bot. Mag. t. 2626 (1826).

Perennial; root fiber slender; stem simple, slender, sulcate, leafy up to the middle; leaves thin, subulate, ca. 1 mm broad, crowded about the middle of the stem, membranous-dilated at base, rough-margined; raceme loose, simple, elongate; bracts hyaline, 16–18 mm long, deltoid-based or lanceolate, long-cuspidate, the lower slightly exceeding the flower, the upper shorter than or equaling the leaves; lower pedicels twin or ternate, the others twin or solitary, jointed at or above the middle; flowers 1.5–2 cm long, much longer than pedicels; perianth segments yellow, green-banded on the back, 1.5–2 cm long, narrowly lanceolate; capsule globose, 6–8 mm long, the valves rugose on the back; seeds small, 2 in each cell, oblong-triquetrous, 4 mm long, 3 mm broad, grayish-brown,
37 marbled, with 3 transverse dorsal folds, concave on the sides, alveolate. Fl. April-May. Fr. June-July.

Stony mountain slopes, about 800 m and taluses. Caucasus: Cisc., S. Transc. Endemic. Described from Mt. Beshtau. Type in Leningrad.

Genus 262. **EREMURUS*** M. B.**

M.B. Fl. taur.-cauc. III (1819) 269; O. Fedtsch. Eremurus, Kritische Uebersicht der Gattung, Zapiski Akad. Nauk, VIII ser., Vol. XXIII, No. 8 (1909).

Flowers white, rose, dingy red, yellow or brown, solitary in axils of bracts; perianth campanulate or cupuliform, withering and persistent or finally caducous; perianth segments distinct or connate at base, 1-nerved or 3–5-nerved (the nerves more readily discernible on dried plants); stamens 6, hypogynous, sometimes exceeding the perianth; filaments filiform or dilated toward base; anthers oblong to linear, dorsifixed near base; ovary 3-celled; style filiform; stigma minute; capsule subglobose, membranous or subligneous, smooth or rarely cross-wrinkled, 3-celled,

* From Greek eremos, desert, and ura, tail, i.e., desert tail.

** Arranged by B.A. Fedchenko.

(35)

Plate III

1. Asphodeline taurica Kunth; 1a) bract, 1b) flower.– 2. Anthericum ramosum L.; 2a) flower.– 3. Asphodeline lutea Rchb. flower, 3b) fruit.

loculicidally 3-valved, 3–4 seeds attached on either side of the septum; seeds irregularly acutely triquetrous; with hard testa, often winged, the wing narrow or (especially in the case of upper seeds in each division) broad; rhizome short, the neck often covered with membranous or fibrillose remnants of old leaves; roots crowded, fleshy, cylindric or fusiform; leaves all radical, often numerous, linear-triquetrous, carinate beneath, narrow or broad, flat or canaliculate above; scape erect, simple, leafless, sometimes very tall; flowering raceme elongate, large; bracts commonly membranous; pedicels mostly jointed at the end.

1. Capsule cross-wrinkled . . . . . 2.
+ Capsule smooth, not ribbed . . . . . 4.
2. Flowers rosy, dark-striped . . . . . 3. **E. Regelii** Vved.
+ Flowers yellow, tawny-brown or white . . . . . 3.
3. Flowers pale yellow; capsule globose; seeds unicolor, tawny-brown. . . . . 1. **E. spectabilis** M.B.
+ Flowers white; seeds gray, black-spotted; capsule pointed . . . . . 2. **E. tauricus** Stev.

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4. Leaves densely tomentose . . . . . 5.
+ Leaves glabrous, sometimes ciliate-margined or slightly pubescent beneath . . . . . 7.
5. Flowers narrowly campanulate, reddish-brown, subtended by broad white bracts . . . . . 9. **E. comosus** O. Fedtsch.
+ Flowers broadly campanulate, large, white or rosy . . . . . 6.
6. Inflorescence dense, many-flowered; perianth segments white, with a yellow spot at base . . . . . 13. **E. Kaufmanni** Rgl.
+ Inflorescence rather loose, few-flowered; perianth segments whitish-rose. . . . . 14. **E. Korovini** B. Fedtsch.
7. Perianth segments finally involute . . . . . 8.
+ Perianth segments finally spreading or reflexed, not involute . . . . 11.
8. Pedicels longer, subhorizontally spreading in fruit . . . . . 9.
+ Pedicels shorter, appressed to stem . . . . . 10.
9. Flowers broadly campanulate; outer perianth segments yellowish-greenish, the inner ones white (flowers as a whole white) . . . . . 7. **E. sogdianus** (Rgl.) Benth. et Hook.
+ Flowers narrowly campanulate, perianth dark orange. . . . . 6. **E. Korshinskii** O. Fedtsch.
10. Flowers white, greenish outside; filaments nearly black; pedicels thickened in upper part . . . . . 4. **E. turkestanicus** Rgl.
+ Flowers stramineous or yellowish-brown; pedicels jointed in upper part . . . . . 5. **E. altaicus** (Pall.) Stev.
11. Bracts linear-filiform, naked . . . . . 12.
+ Bracts linear or lanceolate, ciliate . . . . . 13.
12. Flowers yellow . . . . . 10. **E. stenophyllus** (Boiss. et Buhse) Baker.
+ Flowers white or rose . . . . . 11. **E. Olgae** Rgl.
13. Flowers narrowly tubular-campanulate, reddish-brown; pedicels short, thick, erect . . . . . 8. **E. inderiensis** (MB.) Rgl.
+ Flowers broadly campanulate; perianth segments spreading; pedicels longer, slender, divergent. . . . . 14.
14. Leaves narrow, 3-angled, not more than 1 cm broad . . . . . 15.
+ Leaves broader (not less than 1.5 cm broad), flat or applanate-triquetrous . . . . . 19.
15. Flowers yellow . . . . . 20. **E. luteus** Baker.

+ Flowers white or rose . . . . . 16.
16. Capsule not more than 10 mm in diameter; flowers not more than 15 mm in diameter . . . . . 23. **E. bucharicus** Rgl.
39 + Capsule more than 10 mm in diameter; flowers more than 15 mm in diameter . . . . . 17.
17. Perianth segments white, with a green nerve . . .22. **E. Capusii** Franchet.
+ Perianth segments rosy, rarely white, with a dark nerve . . . . . 18.
18. Capsule globose . . . . . 18. **E. anisopterus** (Kar. et Kir.) Rgl.
+ Capsule ovaloid . . . . . 19. **E. kopetdaghensis** M. Pop.
19. Flowers yellow . . . . . 21. **E. Saprjagajevi** B. Fedtsch.
+ Flowers white or rose . . . . . 20.
20. Plants not more than 1 m tall; capsules large, more than 3 cm in diameter . . . . . 21.
+ Plants from 1.5 to 4 m tall; capsules not more than 2 cm in diameter. . . . . 12. **E. robustus** Rgl.
21. Flowers white . . . . . 22.
+ Flowers rosy-red . . . . . 15. **E. Alberti** Rgl.
22. Leaves green, smooth . . . . . 16. **E. lactiflorus** O. Fedtsch.
+ Leaves glaucescent, rough-margined. . . . . 17. **E. Hilariae** M. Pop. et Vved.

Section 1. **EUEREMURUS** O. Fedtsch. l. c. 22. — Perianth segments more or less erect, 3-nerved, finally involute; stamens longer than perianth.

1. **E. spectabilis** M. B. Fl. taur.-cauc. III (1819) 269; O. Fedtsch. l. c., 24, No. 1. — E. caucasicus Stev. in Bull. Soc. Nat. Mosc. IV (1832) 251; Ldb. Fl. Ross. IV, 190. — Exs.: Hohenaker No. 3444, 2612. — Ic.: M. B. Cent. pl. rar. ross. tab. 61.

Perennial, 100–200 cm tall; roots fleshy, fusiformly thickened, to 25 cm long; collar surrounded by fibrillose remnants of old leaves and membranous sheaths; leaves 6–15, obliquely ascending, glabrous, acute, glaucescent, not more than 4.5 cm broad, the margin smooth or somewhat rough; scape suberect, to 1 cm thick; raceme dense, to 80 cm long, many-flowered; bracts linear-subulate, ciliate; pedicels at anthesis thickened at the end, arched-recurved in fruit; capsules appressed to scape; perianth funnelform-campanulate, to 9 mm long; segments oblong-linear, yellowish; stamens twice the length of perianth; style recurved; capsule globose, ca. 12 mm across, distinctly rugose-plaited; seeds commonly 3 in each cell, triquetrous, scarcely winged, finely cross-wrinkled. May-June. (Plate IV, Figure 1).

40 Stony slopes. — European part: Crim; Caucasus: Cisc., W., S. and E. Transc.; Centr. Asia; Mtn. Turkm. Gen. distr.: Asia Minor, Iran. Described from N. Caucasus, between the Kuma and Sablya rivers. Type in Leningrad.

Note. Contains up to 30% gum (arabinic acid derivative) and yields glue of good quality. The young leaves are edible.

2. **E. tauricus** Stev. in Bull. Soc. Natur. Moscou IV (1832) 253; Ldb. Fl. Ross. IV, 191; Vul'f, Fl. Kryma II, 10. — E. spectabilis f. tauricus Lallem. in Ind. sem. h. Petrop. (1846) 68. — Ic.: Stev. l. c. tab. 7.

Perennial, 80–180 cm tall; roots fleshy, fusiform, to 25 cm long; collar surrounded by fibrillose remnants of old leaves and membranous sheaths; leaves 6–15, obliquely ascending, glabrous, acute, glaucescent, not more than 4.5 cm broad, the margin smooth or somewhat rough; scapes suberect, to 1 cm thick; raceme dense, up to 80 cm long, many-flowered; bracts linear-subulate, ciliate; pedicels thickened upward at anthesis, arched-recurved in fruit; capsules appressed to scape; perianth funnelform-campanulate, to 9 mm long; segments oblong-linear, white, green-banded; stamens twice the length of perianth; style recurved; capsule pointed at the top, ca. 12 mm across, distinctly rugose-plaited; seeds triquetrous, gray, with a black spot and brownish-black stripes. May.

Rocks and mountain taluses. — European part: Crimea. Endemic. Described from Crimea. Type in Helsinki.

3. **E. Regelii** Vved. in Sched. ad Herb. Fl. As. Med. No. 331. Trudy Sr. Az. Gos. Univ., ser. VIII, part 3 (1928). — E. turcestanicus Rgl. in Gartenfl. (1880) 2, tab. 997, non Regel in Gartenfl. (1873) 260 et A.H.P. II (1873) 424, 427. — E. spectabilis var. marginatus O. Fedtsch., l.c. — Exs.: H.F.A.M. No. 331. — Ic.: O. Fedtsch. l.c., tab. 1 (sub. E. spectabilis); Gartenfl. (1880) tab. 997.

Perennial, 80–180 cm tall; roots fleshy, fusiform, to 40 cm long; collar surrounded by hairy remnants of old leaves and membranous sheaths; leaves 6–15, obliquely ascending, glabrous, to 5 cm broad, the margin smooth or rough; scape suberect or flexuous at the end, to 1 cm thick; raceme dense, many-flowered, up to 80 cm long; bracts linear-subulate, ciliate; flowering pedicels thickened at the end, obscurely jointed, commonly brownish-purple; fruiting pedicels arched-recurved; capsule appressed to scape; perianth funnelform-campanulate, to 9 mm long; segments narrowly lanceolate, rose, with a broad dark brownish-purple band, the margin ferruginous-rimmed; stamens about twice the length of
41 perianth; filaments cinnamon-brown; anthers reddish; style brown, recurved; capsule pointed at the top, coarsely membranous-rugose; seeds brown. April-May. (Plate IV, Figure 2).

Note. On account of the large size of roots and their high starch content as well as the occurrence of the plant in large concentrations, it is of considerable industrial importance for the production of glue.

4. **E. turkestanicus**. Rgl. in A.H.P. II, 2 (1873) 424, 427. — O. Fedtsch. l.c., 41. — E. altaicus var. brachystemon Rgl. in Katal. Turkest. Otdel. Politekhn. Vyst. (1872) 8, No. 425. — Ic.: O. Fedtsch., l.c., tab. No. 2.

Perennial, 50–100 cm tall; roots to 18 cm long; scape to 8 mm thick; raceme fairly loose, few-flowered; bracts linear from lanceolate base, lanuginose; pedicels erect at base, subappressed to scape, thickened and divergent at the end; outer perianth segments greenish-yellow, white margined, with a green upward brown band; inner segments broader, white, with a yellowish-green nerve; in drying outer segments distinctly 5-nerved, the inner 3-striped; filaments blackish-purple, subulate, finally exceeding the perianth; ovary green, smooth, obtusely trigonous; capsule smooth, pyriform; seeds gray, narrowly winged, irregularly cross-wrinkled. June.

Mountain slopes. — Centr. Asia: T. Sh., Pam.-Al. Described from Basmandinskoe Ravine. Type in Leningrad.

5. **E. altaicus** (Pall.) Stev. in Bull. Soc. Natur. Moscou IV (1832) 255; Ldb. Fl. Ross. IV, 191; O. Fedtsch. l.c., 44, No. 3. — Asphodelus altaicus Pall. in Acta Acad. Petrop. sp. a II (1779) 858, tab. 19. — Ic.: O. Fedtsch., l.c. tab. 3; Pall. l.c.

Perennial, 50–120 cm tall; roots to 20 cm long; collar with few fibers derived from old leaves and membranous sheaths; scape cylindric, sometimes scape and flowering pedicels reddish-brown (var. purpurascens O. Fedtsch.); leaves lorate, to 3 cm broad, carinate, the margin smooth or rough; raceme densely many-flowered, sometimes with up to 700 flowers (var. multiflorus O. Fedtsch.); bracts linear-filiform from broad base; stipes much longer (especially in var. multiflorus O. Fedtsch.), horizontally spreading; perianth campanulate, yellow or partly brown (var. fuscus O. Fedtsch.), sometimes stramineous, larger (var. pallidus O. Fedtsch.); segments obtuse, finally involute; filaments exceeding the perianth; capsule globose, smooth; seeds triquetrous or irregularly 4-angled, dark, narrowly winged. June. (Plate IV, Figure 3).

42 Mountain slopes. — W. Siberia: Irt., Alt.; Centr. Asia: Dzung.; T. Sh., Pam.-Al. **Gen. distr.**: Mong. Described from Altai foothills, along the Uba River, a tributary of the Irtysh. Type in Geneva.

6. **E. Korshinskii** O. Fedtsch. in Bull. Herb. Boiss. 2-me sér. IV, 8 (1904) 771 et in Mém. Ac. Petrop. (1909) 56. — Ic.: O. Fedtsch., l.c., tab. 4.

Perennial, 60–120 cm tall; roots slender, numerous; collar densely surrounded by remnants of old leaves; scape cylindric, smooth, in drying ribbed in upper part; leaves broadly linear, green; raceme short, fairly loose, to 10 cm broad, strongly attenuate upward; bracts lance-filiform from broad base, brown, ciliolate-margined, much shorter than pedicels of partially opened flowers; pedicels to 3 cm long, slender, ascending at an acute angle, jointed at the end; perianth to 15 mm long, broadly campanulate, dingy orange, at length brownish, abruptly narrowed at joint; perianth segments flat, finally involute, obscurely nerved; stamens $1\frac{1}{2}$–2-several times the length of perianth; ovary smooth, globose, June. (Plate IV, Figure 13).

Meadows in upper mountain zone. — Centr. Asia: Pam.-Al. Endemic. Described from Darvaz. Type in Leningrad.

7. **E. sogdianus** (Rgl.) Benth. et Hook. f., Gen. plant III, (1888) 787, No. 62. — Selonia sogdiana Rgl. et Herd. in Bull. Soc. Nat. de Moscou, II (1868) 458. — Exs.: H. F. A. M. No. 2. — Ic.: O. Fedtsch. l.c. tab. 5; Rgl. et Herder l.c. tab. VI bis.

Perennial, 60–120 cm tall; roots crowded, to 15 cm long; collar surrounded by remnants of old leaves; scape cylindric, tomentulous or largely glabrous (var. subglaber Rgl.); leaves linear, carinate, tomentulous (var. typicus Rgl.) or glabrous and merely scabrous-margined (var. subglaber Rgl.); raceme loose, few-flowered, to 10 cm broad; bracts small, subulate from broad base, membranous, lanuginous-ciliate; pedicels to 8 cm long, terminally nodding in flower, becoming erect in fruit; bracts to 15 mm long, narrowed at base, the outer segments lanceolate yellowish-green, the inner broad white; stamens of opening

flowers equaling the perianth, later greatly elongating; capsule subglobose, to 7 mm long, minutely appressed-hairy; seeds gray, very narrowly winged. June.

Slopes of foothills and mountains. — Centr. Asia: T.Sh., Pam.-Al. Endemic. Described from Karatau, near Boroldai. Type in Leningrad.

Section 2. AMMOLIRION Kar. et Kir. (pro genere). — Perianth narrowly tubular-campanulate; segments 3–5-nerved, finally scarcely inflexed; filaments short, barely exserted.

43 8. **E. inderiensis** (M.B.) Rgl. in A.H.P. II, 2 (1873) 427; O. Fedtsch. l.c., 61. — E. spectabilis f. inderiensis M.B.Fl. taur.-cauc. III (1819) 270 in adnot. — Asphodelus inderiensis Stev. in Bull. Soc. Nat. Moscou IV (1832) 257. — Ammolirion Steveni Kar. et Kir. in Bull. Soc. Nat. Moscou XV (1842) 515. — Ic.: O. Fedtsch. l.c. tab. 6.

Perennial, 80–120 cm tall; roots slender, to 30 cm long; collar densely covered with remnants of old leaves; scape cylindric, glabrous (var. glaber Rgl.) or more or less short-pubescent (var. Steveni Rgl.), as long as or sometimes shorter than the leaves, bracteate in upper part; leaves linear, carinate, the margin rough, smooth or tomentulose; raceme fairly dense, to 40 mm broad; bracts lanceolate, finely ciliate, longer than pedicels; pedicels jointed, upright-ascending, subappressed to scape; perianth cylindric-campanulate, narrowed at base, dingy purple, each segment with a broad green band and 3 nerves; segments narrow, obtuse, finally slightly involute; stamens finally somewhat exceeding the perianth; capsule globose, ca. 1 cm in diameter, smooth; seeds broadly winged. May-June.

Sands. — W. Siberia: Irt.; Centr. Asia: Ar.-Casp., Balkh., Kara K., Kyz. K. Gen. distr.: Arm.-Kurd., Iran., Dzu.-Kash. Described from Inderskie Mountains, on left bank of Ural River. Type in Leningrad.

9. **E. comosus** O. Fedtsch. in Bull. Herb. Boiss. 2-me sér., IV (1904) No.8. — Ic.: O. Fedtsch. l.c., tab.7. — Exs.: B. Fedch., Gerb. Turk. Fl., No.56.

Perennial, 60–100 cm tall; collar with few sheaths; scape slender, beset with numerous bracts; leaves linear, carinate, puberulous; raceme fairly dense, narrow; bracts chartaceous, glabrous, broadly lanceolate, white, dark-banded, before flowering much longer than buds, forming a dense white terminal tuft, at anthesis half as long as pedicel, the margin long-ciliate; pedicels ascending at a very acute angle, slender, somewhat enlarged upward, obscurely jointed; perianth narrowly campanulate, the greenish-pink or carneous segments slightly involute; stamens barely exceeding the perianth; capsule glabrous, smooth. June-July. (Plate IV, Figure 4).

Loess and stony slopes in the middle mountain zone. — Centr. Asia: Pam.-Al. Endemic. Described from Gissar, near Faizabad; Darvaz near Kalaikhumb. Type in Leningrad.

Section 3. TROCHANTUS O. Fedtsch., l.c. — Perianth broadly campanulate; segments spreading, 1-nerved, at anthesis linear-subulate, glabrous.

10. **E. stenophyllus** (Boiss. et Buhse) Baker in Journ. Linn. Soc. XV (1877) 281. — Ammolirion stenophyllus Boiss. et Buhse, in Nouv.
44 Mém. Soc. Natur. Moscou (1860) 218. — E. aurantiacus Baker in Journ. Linn. Soc. XV (1879) 285. — E. Bungei Baker in Journ. of Botany XVII (1879) 17. — Ic.: O. Fedtsch., Eremurus, tab. 8. — Exs.: B. Fedch., Gerb. Turkest. Flory No. 1.

Perennial, 50–80 cm tall; roots slender, 3–4 mm long and to 5 mm thick (var. pilosa O. Fedtsch.); collar densely surrounded by remnants of old leaves and membranous sheaths; scape cylindric, 3–4 mm thick; leaves subtriquetrous, narrowly linear, sometimes broader (var. Bungei O. Fedtsch.), rough-margined, sometimes (var. pilosa O. Fedtsch.) with short hairs on the veins; raceme dense or very dense (var. Bungei O. Fedtsch.), cylindric, to 4.5 cm in diameter; bracts subulate-filiform, half the length of pedicel; pedicels horizontal, jointed at the end; perianth broadly campanulate; segments 10 mm long, spreading, bright golden-yellow; filaments yellow; anthers orange; style yellow; ovary smooth, yellow; capsule globose, small, ca. 8 mm in diameter; seeds small, not compressed at the top. June-July.

Stony slopes in the middle mountain zone. — Centr. Asia: Pam.-Al., Mtn. Turkm. **Gen. distr.**: Iran., Ind.-Him. Described from Elburz Range between Askol and Firuzkuh. Type in Leningrad.

11. **E. Olgae*** Rgl. in A.H.P. II (1873) 425–430. — Henningia Olgae Rgl. in Katal. Turkest. Otd. Politekhnich. Vystavki v Moskve (1872) 7. — E. Aschersoni O. Kuntze, A.H.P. (1887) 243. — Exs.: HFR No. 1869. — Ic.: O. Fedtsch. l.c. tab. 9; Regel' in A.P. Fedchenko, Putesh. v Turkest., part 12, Plate 9.

Perennial, 60–160 cm tall; roots fusiform, thickened at base, to 35 cm long; collar surrounded by fibrillose leaf remnants and hyaline sheaths; scape slender, cylindric, glabrous; leaves glaucous, narrowly linear, membranous-margined, 2–15 mm broad; raceme long but not very dense, subcylindric in outline or much narrowed upward (var. australis B. Fedtsch.); bracts glabrous, filiform-subulate, membranous at base, shorter than pedicels; pedicels subhorizontally spreading, jointed at the end, sometimes (var. australis B. Fedtsch.) the lower much longer than the upper (to 60 mm and from 25 mm, respectively); perianth whitish-rose, subrotate, the lobes 1-nerved, 12 mm long; stamens pale, equaling
47 the perianth; capsule globose, 10–12 mm in diameter, smooth, glabrous; seeds gray, narrow-winged. June-July. (Plate IV, Figure 5).

Loess slopes of foothills and mountains. — Centr. Asia: T.Sh., Pam.-Al., Amu D., Mtn. Turkm. **Gen. distr.**: Iran. Described from Zeravshan Mountains. Type in Leningrad.

Note. The roots contain dextrin and are therefore used for glue production. The flowers are very decorative and the species is horticulturally one of the most valuable within the genus Eremurus; it is unfortunately somewhat less hardy than the larger but less graceful E. robustus Rgl.

* Named for O.A. Fedchenko who wrote a monograph of the genus Eremurus.

Plate IV

1. Eremus spectabilis M.B.– 2. E. Regelii Vved.– 3. E. altaicus (Pall.) Stev.– 4. E. comosus O. Fedtsch.– 5. E. Olgae Rgl.– 6. E. robustus Rgl., aspect.– 7. E. Kaufmanni Rgl.– 8. E. Alberti Rgl.– 9. E. lactiflorus O. Fedtsch.– 10. E. anisopterus Kar. et Kr.– 11. E. Korovini B.Fedtsch.– 12. E. kopetdaghensis M. Pop.– 13. E. Korshinskii O.Fedtsch.: annotations for all flowers: a) flower; b) bract; c) capsule.

Section 4. **HENNINGIA** Kar. et Kir. (1842). — Bracts linear or lanceolate, ciliate; perianth subpatent, the 1-nerved segments finally convergent.

12. **E. robustus** Rgl. in Gartenflora XXII (1873) 275; O. Fedtsch. l.c., 92 No. 11. — Henningia robusta Rgl. et Herd. in Bull. Soc. Natur. Moscou (1869) 457 et in adnot. ad. No. 1091, p. 457. — Ic.: Gartenflora XXII (1873) tab. 769; O. Fedtsch., l.c., tab. 11.

Perennial; roots fleshy, stout, cylindric, longer than in other Eremurus species (up to 150 cm); scape stout (to 22 mm thick), cylindric, glabrous, slightly glaucescent; leaves glaucescent, initially triquetrous, in age carinate, to 75 cm long, 7 cm broad, rough-margined; raceme dense, very long, many-flowered (with up to 800 flowers); bracts linear from enlarged base, densely lanuginous-villous; pedicels straight, spreading, jointed at the end; perianth broadly campanulate, to 2 cm in diameter; segments rose, pale rose (var. pallidus O. Fedtsch.), rarely white (var candidus O. Fedtsch.), lanceolate, the inner broader; filaments equaling the perianth; ovary yellowish, smooth; capsule globose, ca. 2 cm in diameter; seeds gray, broad-winged. June-July. (Plate IV, Figure 6).

Mountain meadows — Centr. Asia: T. Sh., Pam.-Al. Endemic. Described from the foothills of Talgar in the Trans-Ili Ala Tau at altitudes of 400–1000 m. Type in Leningrad

Note. The roots are used for extraction of glue. Boiled roots are used for food and they are fairly palatable when young. A good honey plant. It develops in cultivation even more luxuriantly than under natural conditions and belongs among the most beautiful Central Asian perennials that have been introduced into cultivation. It displays marked winter hardiness in the Moscow Region, while in Leningrad it suffers to some extent from excessive moisture.

13. **E. Kaufmanni** Rgl. in A.H.P. II (1872) 425 et 430. — Henningia Kaufmanniana Rgl. in Katal. Turkest, Otd. Politekhn. Vyst. v Moskve (1872). — Ic.: Regel', Liliaceae in A.P. Fedchenko, Putesh. v Turkest., Plate III; O. Fedtsch. Eremurus, tab. 13.

Perennial, 50–90 cm tall; roots fleshy; collar densely surrounded by
48 black fibrillose remnants of old leaves; scape densely tomentose, in upper part bracteate; leaves linear-lanceolate, to 2 cm broad, densely tomentose, raceme dense; bracts linear-filiform; pedicels divergent, straight, rather slender, jointed at the end; perianth campanulate, white; segments yellowish at base, thin, lance-spatulate; filaments dilated at base; style white; ovary globose, yellowish; capsule globose, to 10 mm in diameter, thin-walled; seeds cinnamon-brown to gray, broad-winged. June. (Plate IV, Figure 7).

Mountain meadows. — Centr. Asia: Pam.-Al. Endemic. Described from Zeravshan. Type in Leningrad.

Note. One of the most beatiful and graceful species of the genus Eremurus, difficult to grow. Foreign horticultural firms show much interest in this plant, but everything offered in their catalogues under the name E. Kaufmanni refers to various other species.

14. **E. Korovini** B. Fedtsch. sp. nova in Addenda III, p. 733. — E. Kaufmanni O. Fedtsch., Monogr. Eremurus p. 123 p.p. (quoad plantam e Kendyr-aus).

Perennial, 60–80 cm tall; roots numerous, not much thickened; collar densely surrounded by black fibrillose remnants of old leaves; scape in lower one-fourth short-pubescent, then glabrous, to 8 mm in diameter; leaves short-pubescent, linear, subacute, to 30 cm long, to 15 mm broad, not reaching the base of inflorescence; raceme fairly loose, 20–30 cm long, 4–6 cm in diameter at flowering; bracts linear-lanceolate, white-membranous, dark-banded, the margin sparsely ciliate; pedicels obliquely ascending, slender, jointed at the end, at anthesis slightly longer than flowers; perianth broadly campanulate; segments whitish-rose, thin, 15–18 mm long and ca. 5 mm broad; filaments slender, white, dilated toward base, yellowish, style white, filiform; ovary globose; capsule globose, 10 mm ca. in diameter, thin-walled. (Plate IV, Figure 11).

Centr. Asia: T. Sh. Endemic. Described from W. Tien Shan: Kendyr-auz and Angren River valley, 3200 m.

Note. Worth introducing into cultivation as a decorative plant.

15. **E. Alberti** Rgl. in A. H. P. VIII (1884) 668; O. Fedtsch. l. c. No. 15. — Ic.: A. H. P. VIII, tab. VI; O. Fedtsch. l. c., tab. 15. — Exs.: H. F. A. M. No. 330.

Perennial, 90–100 cm tall; roots crowded, stout; collar densely clothed in fibrillose remnants of old leaves and membranous sheaths; scape in drying ribbed, smooth; leaves narrowly linear-lanceolate, flat, to 1.5 cm broad; raceme fairly loose; bracts white-membranous, gradually attenuate from lanceolate base; pedicels slender in flower, ca. 30–35 mm long,
49 divergent, finally thickening, horizontally spreading; bracts dingy-red, the segments narrowly oblong-lanceolate; stamens shorter than perianth segments; capsule ovoid-globose, ca. 23 mm long and 20 mm broad, narrowed toward the top, smooth, thick-walled; seeds gray, broad-winged, large, the wing ca. 1 cm long. (Plate IV, Figure 8).

Loess foothills, clay hills, and stony mountain slopes. — Centr. Asia: Pam.-Al., Amu D. Endemic. Described from the slopes of the south of Kulyab in the Khodzhamumyk mountains, 3000 m. Type in Leningrad.

Note. One of the most graceful species of the genus Eremurus, deserving introduction into cultivation.

16. **E. lactiflorus** O. Fedtsch. in Bull. Herb. Boiss. 2-me sér., IV, No. 8 (1904) 779. — Henningia Aucheriana Rgl. (non Boiss) in Bull. Soc. Natur. Moscou, II (1868) 138, No. 1091. — Ic.: O. Fedtsch. in Bull. Herb. Boiss. l. c., p. 774; O. Fedtsch., l. c. tab. 16.

Perennial, 55–100 cm tall; roots crowded, fleshy, slender; collar clothed in membranous sheaths and sparse fibrillose remnants of old leaves; scape faintly reddish, bracteate in upper part; leaves glaucescent-green, linear, to 4 cm broad, becoming reddish at base in fruit; raceme loose, few-flowered (becoming many-flowered in cultivation and then bearing up to 100 flowers); bracts linear from lanceolate base, brownish, with a dark nerve; pedicels subhorizontal, jointed; unopened flowers reddish; open flowers spreading, to 35 mm in diameter; perianth segments mealy-white, yellowish at base, red-nerved on the back, finally convergent

at the tips; stamens longer than perianth, white, yellow at base, 3 longer than the others; style white; ovary glabrous, smooth, yellow; capsule very large (larger than in all other species), trigonous-globose, ca. 3.5 cm in diameter, strongly inflated, smooth, reddish in maturity; seeds gray, broad-winged. April-May. (Plate IV, Figure 9).

Stony mountain slopes. — Centr. Asia: T. Sh. Endemic. Described from Chimgan area. Type in Leningrad.

Note. One of the most beautiful species of Eremurus, deserving particular attention on the part of horticulturists. Stands up well to cold winters and flowers much earlier than the other species.

17. **E. Hilariae*** M. Pop. et Vved. in Opred. rast. okr. Tashkenta I (1923) 58; Schedae ad H. F. A. M. fasc. 1, decembr. (1924). — Exs.: H. F. A. M. fasc. I, No. 1.

Perennial, 30–90 cm tall; roots fleshy, slender; collar clothed in membranous sheaths and sparse fibrillose remnants of old leaves; scape cylindric, bracteate in upper part; leaves glaucous or canescent, broadly
50 linear, to 25 mm broad and up to 40 cm long, the margin and veins rough; raceme finally loose, few- or many-flowered; bracts linear from lanceolate base, with a dark nerve, the margin long-ciliate; pedicels obliquely ascending to subhorizontally spreading, about the length of flower; open flowers to 35 mm in diameter; perianth segments white, yellowish at base, oblong, obtuse, finally convergent; stamens barely exceeding the perianth, 3 shorter than the rest; ovary glabrous, smooth; capsule very large, nearly as in the preceding species, ca. 2 cm and more in diameter, April.

Stony and clayey-gypseous slopes. — Centr. Asia: Syr D. Endemic. Described from the vicinity of Kaplanbek, from Kyngrakh hill (NE of Tashkent). Type in Tashkent; cotype in Leningrad.

18. **E. anisopterus** (Kar. et Kir.) Rgl. in A. H. P. II (1873) 429; O. Fedtsch. l.c., 141. — Henningia anisoptera Kar. et Kir. in Bull. Soc. Nat. de Moscou XV (1842) 518, No. 829. — E. Korolkovi Rgl. in A. H. P. III (1875) 116. — Ic.: O. Fedtsch., l.c., tab. 17.

Perennial, 35–70 cm tall; roots fusiform; collar clothed in membranous sheaths and fibers; scape pubescent at base, then glabrous; leaves narrowly linear, triquetrous, to 65 cm long, smooth, the margin rough; raceme loose, open; bracts membranous, lanceolate, broader at base; pedicels ascending in flower, commonly spreading in fruit, jointed at the end; perianth globose-campanulate; segments finally convergent, white to pale rose, dark-spotted at base, the nerves pubescent on the inside; stamens shorter than perianth; capsule globose, to 20 mm in diameter, smooth, with stiff valves; seeds strongly rugose, broad-winged. April-May. (Plate IV, Figure 10).

Wet sands. — Centr. Asia: Balkh., Syr D., Kyz. K.; Kara K. **Gen. distr.**: Iran., Dzu.-Kash. Described from sands between Sassyk-paustau spring and Arganaty. Type in Leningrad.

Note. The dextrin content in the roots of this species is particularly high and thus lends itself well to production of glue employed with plant

* Named for Prof. I.A. Raikova, explorer of the Pamirs.

substances in the making of dishes for oil (both from vegetable and animal source).

19. **E. kopetdaghensis** M. Pop. in Flora Turkmenii, part 1 (1932) 257.

Perennial; base of leaves and stem surrounded by thin hyaline sheaths; stem cylindric, glabrous, ca. 60 cm long, twice the length of leaves; leaves smooth, lustrous, narrowly linear, 3–4 mm broad; raceme loose, especially after flowering; bracts crisp-ciliate on the margin, lance-linear, shorter than stipe; fruiting pedicels subhorizontal, turning upward at the ends; jointed just below the flower, 2–3 cm long; flowers wide open, rose,
51 large; segments 15–17 mm long, dark-nerved on the back, not involute in drying; capsule ovaloid, ca. 15 mm long. (Plate X, Figure 12).

Centr. Asia: Mtn. Turkm. Endemic. Described from area of Margyz village, NW of Trgoi, dry riverbed of the salty stream Adzhidere. Type in Leningrad.

20. **E. luteus** Baker in Journ. of Botany. XVII (1879) 17; O. Fedtschenko, l.c., 150. — Ic.: O. Fedtsch. l.c., tab. XIX; Regel in A.H.P. VIII, tab. XIX.

Perennial; roots cylindric, long; collar densely fibrillose; leaves numerous, erect, or subpendent, narrowly linear, yellowish above, rough-margined, shorter than stem; scape stout, cylindric, smooth, 20–30 cm long; bracts lance-linear, acuminate, ciliate-margined, shorter than pedicels; pedicels straight, spreading, 2–5 cm long, jointed at the end, becoming thickened and more spreading in fruit; perianth yellow, markedly irregular, the spreading segments oblong-linear; filaments unequal, shorter than perianth; capsule upright, smooth, oblong-clavate; seeds rugose, broad-winged.

Centr. Asia: Mtn. Turkm. **Gen. distr.**: Arm.-Kurd., Iran. Described from N. Persia. Type in London.

21. **E. Saprjagajevi** B. Fedtsch. sp. n. in Addenda, p. 733.

Perennial, 90–140 cm tall; roots to 20 cm long; collar with numerous fibrillose remnants of old leaves; leaves lorate, to 2.5 cm broad, faintly carinate, smooth-margined; raceme initially fairly dense, becoming loose, many-flowered; bracts linear-filiform from broadly lanceolate base, ciliate-margined; pedicels at first erect, slightly shorter than bracts, jointed at the end, at length elongating to nearly twice the length of flower and divergent from it at an acute angle; perianth yellowish-rose; segments ca. 15 mm long, lanceolate, with 1 distinct nerve, initially forming a narrow tube, finally somewhat spreading, not involute; filaments at first shorter than perianth, at length slightly excerted; ovary globose. July.

Subalpine zone, on stony ground. — Centr. Asia: Pam.-Al., mountains to the south of Shurabad. Endemic. Described from Tadzhikistan, city of Shurabad, 12 km south. Type in Leningrad.

22. **E. Capusii** Franchet in Ann. Sc. Natur. XVIII (1884) 260. — E. luteus O. Fedtsch. l.c., 150 (pro parte). — **E. baissunensis** O. Fedtsch. in Not. Syst. H.B.P. I, 3 (1921) 9.

Perennial; roots thickened, cylindric; collar densely hairy, in upper part densely clothed in translucent scales; leaves to 30–40 cm long,

52 6–12 mm broad, rough-margined; scape glabrous, cylindric, shorter than leaves; inflorescence fairly loose, not elongating; bracts lance-acuminate, finally shorter than pedicels, the margin fimbriate-ciliate; flowering pedicels ca. 25 mm long, spreading, some subarcuate-recurved; perianth white; segments obovate-lanceolate, 1-nerved, obtuse, after anthesis spreading, ca. 1.5 cm long; stamens about equaling the perianth; capsule ovoid-globose, smooth, the base of style extended into a point. April-May.

Mottled strata in low mountains. — Centr. Asia: Pam.-Al., Amu D. Endemic. Described from the deserts between Kalif and Karakamor. Type in Leningrad.

23. **E. bucharicus** Rgl. in A.H.P. VII (1884) 670; O. Fedtsch., l.c., No. 20. — E. Suworowi Rgl. in A.H.P. VIII (1884) 672. — E. parviflorus Rgl. in A.H.P. IX (1886) 609. — Ic.: A.H.P. VIII, tab. XX, tab. VI (E. Suworovi); O. Fedtsch. l.c. tab. 18; O. Fedchenko in B. Fedchenko Fl. Az. Ross., part 3, Plate 15.

Perennial; roots crowded, stout, fusiform, to 15 cm long; collar clothed at base in membranous sheaths and fibrillose remnants of old leaves; scape erect, glabrous or at base short-pubescent, cylindric, to 40 cm long; leaves about as long as or longer than scape, triquetrous, distinctly carinate, glabrous, the margin in upper part somewhat rough; raceme loose, up to 75 cm long; bracts linear-filiform from broad base, sparsely hairy on the margin; pedicels three to several times the length of bracts, obliquely ascending, reddish on the outside; flowers somewhat nodding; perianth segments wide open, all with 1 purple nerve; outer segments oblong, whitish-ferruginous on both sides, to 4 mm broad, 1.5 cm long; inner segments elliptic, broader, white on both sides, drying yellowish; filaments slender, one-third shorter than perianth, yellow; anthers orange; capsule ovoid-globose, abruptly narrowed toward base, initially smooth, finally somewhat rugose, ca. 15 mm long and 13 mm broad; seeds triquetrous, reticulate-rugose, broad-winged at the top. June-July.

Wooded mounds in the foothills and in the lower mountain zone. — Centr. Asia: Amu D., Pam.-Al. Endemic. Described from Gazi-Mailik mountains. Type in Leningrad.

Note. The various species of Eremurus are liable to hybridize. The species particularly prone to hybridization are E. robustus Rgl., E. Olgae Rgl., E. stenophyllus (Boiss. et Buhse) Baker and E. spectabilis M.B. Eremurus hybrids have already gained wide distribution in gardens. In identifying Central Asian Eremurus plants, one should bear in mind that these may include specimens of hybrid origin, with intermediate characteristics.

53 Genus 263. **ANTHERICUM** * L.**
L. Sp. pl. (1753) 310.

Perianth white, rotate; segments 6, spreading, all 3-nerved; stamens naked, filiform; ovary with 4–8 seeds in each locule; capsule globose or

* From Greek anthericon, rich in flowers.
** Arranged by E.G. Chernyakovskaya.

slightly 3-lobed, coriaceous; seeds angled, black. Plants with fibrous roots; inflorescence branched or branched-paniculate; pedicels slender, jointed below the middle; stems leafless, simple or branched; leaves narrowly linear, confined to stem base.

1. **A. ramosum** L. Sp. pl. (1753) 310; Ldb. Fl. Ross. IV, 195; Shmal'g., Fl. II, 483.— *Ornithogalum ramosum* Lam. Fl. Fr. III (1778) 278.— *Phalangium ramosum* Poir. Encycl. V (1804) 250.— *Anthericus ramosus* Asch. et Gr. Synops. III (1905) 48.— *A. ramosum* var. *simplex* Kling. Fl. v. Preuss. (1849) 412; Miscz. Fl. cauc. crit. 35 (1912) 133; Asch. et Gr. III, 49; var. *fallax* Label. Arch. V. Fr. Naturg. Mekl. XIII (1859) 53.— Ic.: Bot. Mag. t. 1055; Rchb. Ic. Fl. Germ. t. 1114; Fedch. and Fler., Fl. Evrop. Rossii, Figure 159.— Exs.: HFR No. 139.

Perennial, glabrous plants, 40–75 cm tall; rhizome short, oblique; root fibers numerous, fleshy, cylindric; leaves 10–12, linear, to 6–8 mm broad, 50–60 cm long, canaliculate, green, flat, glabrous, erect, attenuate toward apex; stems terete, slender, leafless; inflorescence paniculate with remotely flowered branches; bracts small, subulate, green, to 2 mm long; perianth white, 10–13 cm long; segments distinct, 3-nerved on the back, oblong-lanceolate, the lower twice as broad as the rest; stamens filiform, white, the inner longer, exceeding the perianth segments; style filiform, straight, recurved at apex, always exserted from the fading flower; capsule small, globose, 5 mm in diameter, obtusely lobed; seeds black, angled, to 3 mm long. June-July. (Plate III, Figure 2, a).

Stony mountain slopes, gullies, scrub, pine and oak woods, birch groves, exposed places; meadow, steppe and chalky slopes, ravine slopes, along rivers and in river floodplains.— European part: U. Dnp., M. Dnp., Bl., U. Don, Crim; Caucasus: Cisc. (Kislovodsk), according to Grossheim: Kuban, Terek, Baku. **Gen. distr.**: Centr. Eur. to S. Sweden and Denmark in the north; France, Iberian Peninsula, N. Italy, N. part of Balkan Peninsula, Poland, Galicia, Lithuania, Baltic States. Described from W. Europe.

Note. The form var. *simplex* Kling. (v. *fallax*), noted by many authors, with a simple unbranched inflorescence, occurs together with the typical form (Kiev Region, Belorussia, Crimea, Pyatigorsk); *Anthericum* has been in cultivation since 1597.

54 Genus 264. **FUNKIA*** SPRENG.**

Spreng. Syst. II, 40.— *Hosta*, Tratt. Obs. 11, 56.

Perianth large, 4.5–5 cm long, infundibular, 6-parted; segments short, triangular-tipped, erect, all equal; stamens 6, filiform, distinct, naked, inserted at perianth base, equal, about the length of perianth and slightly exserted, somewhat curved; anthers linear-oblong, slightly emarginate at apex, biparted at base, dorsifixed and versatile; ovary sessile, oblong, 6-grooved, 3-locular; ovules numerous (10–30), biseriate; style filiform, furrowed-triquetrous, turned outward, curved, slightly exserted; stigma

* Named for the pharmacist H.G. Funk (1771–1839), an expert on plants of S. Germany.

** Arranged by E.G. Chernyakovskaya.

capitate; capsule linear-oblong, coriaceous, trigonous; seeds numerous, compressed, winged at the top, black, lustrous, very finely puncticulate. Stemless herbs with fibrous roots; leaves radical, long-petioled, ovate to oblong, acuminate, herbaceous, reticulate-veined, the petioles sheathing at base; scapes simple, bearing a terminal many-flowered raceme; flowers large, lilac or bluish, pedicellate; bracts solitary.

Cultivated for the beautiful flowers. Growing satisfactorily in the open. Some of the species have medicinal use.

1. Leaves broadly ovate, rounded at base, with 6–8 subsidiary nerves. . . . . 1. **F. ovata** Spreng.

+ Leaves lanceolate, narrowed toward base, 3- or 4-nerved, rarely 7-nerved. . . . . 2. F. lancifolia Spreng.

1. **F. ovata** Spreng. Syst. II 240; Baker Gard. Chron. (1868) 1015; Kom. Fl. Manchzh. I (1901) 443. — F. ovata var. α Kunth Enum. IV (1843) 591. — Hemerocallis coerulea Andrews. Bot. Rep. tab. 6. — Hosta coerulea Tratt. Tab. I, 189; Engler in Nat. Pflanzenfam. II, 5, p. 40. — Ic.: Andrews Bot. Rep. tab. 6; Bot. Mag. 1806, t. 894; Redouté Lil. tab. 106.

Perennial; leaves green, broadly ovate, often subcordate-ovate, cuneate at base, tapering into a long petiole; acuminate at base, very large, 12–20 cm long, 7–10 cm broad; with 6–8 subsidiary nerves; pertioles winged, to 25 cm long; flowering scape to 85 cm long; raceme loosely 10–12-flowered, longer than the leaves; bracts solitary, ovate, hyaline-membranous, acuminate, about twice the length of pedicel, the lower ca. 15–22 mm long, 6–11 mm broad; pedicels 6–9 mm long, the lower
55 nutant; flowers to 5.5 cm long, initially spreading, at length nodding; perianth pale lilac or more often dark lilac-azure, slender-tubed, plaited upward, the segments to 8 mm broad; capsule pendulous, 27–40 mm long. August. (Plate V, Figure 3, a, b).

Rocky and stony river banks, near ponds and lakes. — Far East: Sakh., at Lake Traitsisk. **Gen. distr.**: Japan, Manchuria. In N. China only in cultivation. Described from Japan.

Note. Cultivated in China for the sake of the roots which are used as a remedy for toothache.

2. **F. lancifolia** Spreng. Syst. II (1825) 41; Baker, Gard. Chron. (1868) 1015; Baker in Journ. Linn. Soc. XI (1871) 368; Kom. Fl. Manch. I (1901) 471. — F. ovata var. β Kunth. Enum. IV (1843) 592. — Hosta lancifolia (Thunb.) Engl., Nat. Pflanzenfam. II, 5, p. 40.

Perennial; leaves green, lanceolate, 9–11 cm long, 2–2.5 (4.5) cm broad, 4–7-nerved; petioles 5–6 cm long, winged; scape 30–40 cm long; raceme rather densely 8–16-flowered; bracts solitary, to 10–12 mm long, lanceolate, long-acuminate, at base to 4 mm broad; pedicels 7–10 mm long, the lower nutant; perianth pale lilac, 4–5.5 cm long, slender tubed; capsule pendulous. August. (Plate V, Figure 2, a).

Rocks, river banks, overgrown sand dunes. In Manchuria on mountain slopes and at forest borders. — Far East: Uss., Tumyn-gan River basin; on Amur at village of Kinneli. **Gen. distr.**: Japan, Korea, Sakhalin, and Manchuria. Described from Japan.

Note. The leaf breadth in this species is subject to variation. Specimens with 7-nerved leaves up to 4.5 cm broad, but with smaller flowers,

occur side by side with narrow-leaved forms. Similar small-flowered forms predominate everywhere in the USSR, the length of flower being 4–4.5 cm, less than in Korea and Japan.

Genus 265. **HEMEROCALLIS*** L.**

Syst. ed. 1(1735), Sp. pl. ed. I(1753)324.

Perianth large, infundibular, deeply 6-parted, curved-tubular at base; segments equal, oblong-spatulate, spreading; stamens inserted in throat at base of segments, filiform, recurved; anthers linear-oblong, dorsifixed; ovary sessile, oblong, obtusely trigonous, with numerous biserially arranged ovules in each locule; style filiform, long, recurved; stigma capitate; capsule coriaceous, obovoid, obtusely trigonous, rugose,
56 narrowed at base, 3-celled, 3-valved; seeds 6–12 in each cell, borne in 2 rows, ovate, angled, black, lustrous; fibrous roots short, fleshy; leaves all radical, linear; inflorescence a terminal double cincinnus passing into a panicle; flowers large, yellow, orange or reddish-orange.

Ornamental plants with beautiful flowers, widely grown in gardens.

1. Flowers fragrant, yellow or orange . . . . . 2.
+ Flowers inodorous, rufous, the inner segments with membranous-undulate margin and transversely anastomosing nervature . . . . . 1. **H. fulva** L.
2. Inflorescence branched, many-flowered; stems long; all flowers long-pediceled; nerves of inner perianth segments not anastomosing; bracts hyaline, small . . . . . 2. **H. flava** L.
+ Inflorescence simple, few-flowered; stems equaling or slightly overtopping the leaves; flowers subsessile; nerves of perianth segments anastomosing . . . . . 3.
3. Flowers bright orange; perianth tube 10–15 mm long; bracts broad, nearly covering the perianth tube; leaves 10–18 mm broad . . . . . .3. **H. Middendorffii** Trautv. et Mey.
+ Flowers yellow . . . . . 4.
4. Flowers yellow, subsessile; bracts equaling the pedicel; perianth tube not more than 1 cm long; leaves 14–18 mm broad . . . . . 4. **H. Dumortieri** Morren.
+ Flowers pale yellow, solitary or 2 or 3; perianth tube elongated; pedicels 5–5.4 mm long; bracts small; leaves 4–7 mm broad . . . . . 5. **H. minor** Mill.

1. **H. fulva** L. Sp. pl. ed. 2 (1762) 462; Shmal'g., Fl. II, 483; Kunth Enum. IV, 588; Miscz., Fl. cauc. crit. II (1912) 136. — Ic.: Rchb. Ic. Fl. Germ. t. 1113; Bot. Mag., t. 64.

Perennial; stems long; radical leaves narrowly linear, carinate, acute, slightly shorter than stems, 12–30 mm broad; cauline leaves few, very short, scalelike; flowers 6–12, not fragrant, to 7 cm long, dark yellow, rufous-reddish within; perianth segments oblong-lanceolate, obtuse, the inner wavy-margined, all with numerous transversely anastomosing longitudinal nerves; pedicels short; bracts small, lanceolate. June.

* From Greek hemera, day, and callos, beauty, implying beauty of the day (Miller, 1797).

** Arranged by E.G. Chernyakovskaya.

Plate V

1. Asphodeline dendroides (Hoffm.) Woron.— 2. Funkia lancifolia Spreng.; 2a) flower.— 3. F. ovata Spreng. leaf and fruiting inflorescence; 3a) flower; 3b) capsule and bract.— 4. Hemerocallis flava L. inflorescence.

Wet swampy places and coastal meadows. — Caucasus: S. and W. Transc.,
59 Tal. Gen. distr.: Centr. Eur., Med., Iran., Jap.-Ch. Described from E. India. The original provenience of this as well as of many widely cultivated species, is so far unknown. Numerous garden varieties, especially from Japan, are known.

2. **H. flava** L. Sp. pl. ed. 1 (1753) 324, ed. 2 (1762) 462; Kunth. Enum. IV, 588; Ldb. Fl. Alt. II, 39, Fl. Ross. IV, 194; Kryl., Fl. Zap. Sib. III (1929) 591; Kom., Fl. Manchzh. I (1901) 473; Kom. and Al., Opred. rast. Dal'nevost. Kr. I (1931) 361; Fl. Zabaikal. (1931) 148. — Ic.: Bot. Mag. t. 19; Redouté Lil. t. 15; Rchb. Ic. Fl. Germ. t. 1112.

Perennial; rhizome short, vertical, bearing below numerous stringy root fibers; stem leafless, 30–70 cm long; inflorescence branched; leaves all radical, broadly linear, long-acuminate, about equaling or shorter than the stem, 5–15 mm broad; flowers 2–8; pedicels shorter than perianth, 27–54 mm long; bracts hyaline, small, lanceolate; flowers fragrant, bright yellow, all long-pediceled, the pedicels 7–9 cm long; perianth deciduous, funnelform, deeply cleft to 3/4 into 6 spreading segments, tubular at base; outer perianth segments lanceolate, somewhat narrower than the inner ones, oblong-elliptic, ca. 2 mm broad, acuminate, straight-margined, without cross-anastomosis; segments 3–4 times the length of tube; capsule ovoid to ovaloid, obtusely trigonous, cross-wrinkled, ca. 2.5 cm long and 1–1.5 cm broad; seeds ovoid-trigonous, sharply ribbed, black 4–5 mm long. End of May — beginning of July. (Plate V, Figure 4).

Forest water meadows or rarely steppe meadows, river valleys, meadow slopes, dry glades, shores of rivers and lakes, margins of pine and birch woods. — W. Siberia: Ob, Irt., Alt.; E. Siberia: Yen., Lena-Kol, Ang.-Say., Dau.; Far East: Ze.-Bu., Uss.; Caucasus; S. Transc. **Gen. distr.**: Atl. Eur., Med., Jap.-Ch. Described from Hungary.

Note. Our herbarium contains Lagovskii's specimen from S. Transcaucasia (station of Kodi between Tiflis [Tbilisi] and Erivan) which is in very poor state of preservation. Mishchenko (Fl. cauc. crit. v. 35, 1912, 136) considers the occurrence of this species in Transcaucasia very likely.

3. **H. Middendorffii** Trautv. et Mey. Fl. ochot. (1856) 94, No. 321; Maxim. Prim. Fl. Amur. (1859) 283; Kom., Fl. Manchzh. (1901) 439. — Ic.: Rchb. Gartenfl. t. 522; Kom. and Alis., Opred. rast. Dal'nevost. kr. (1931) Plate 111.

Perennial; root fibers large, cylindric; rhizome oblique, stout; leaves all radical, sheathing at base, the collar clothed in remnants of dead leaves, very long, 6–13 (18) mm broad, the lower 2 or 3 broader (23 mm), about equaling the stem, long-acuminate, pendulous, flat, glabrous, and smooth; stems leafless; inflorescence simple; flowers 3 or 4, subsessile,
60 bright orange, fragrant, gathered in a terminal head; bracts large, to 2.5–3 cm long, broad, enveloping the inflorescence, rounded-ovate, long-acuminate, half as long as to equaling the perianth tube; perianth funnelform, 9 cm long, the tube 10–15 mm long; segments reflexed at the tip, flat, oblong, acuminate, all equal, many-nerved, the inner 15–21 mm broad, membranous-margined and slightly anastomosing, the outer

12–15 mm broad, not anastomosing; capsule 2.5–3 cm long, obovoid, obtuse, cross-wrinkled, nearly covered by the bract. May-June-August.

Meadows, mountain slopes, broad-leaved woods, scrub, and meadows.— Far East: Ze.-Bu., Uda, Okh., Uss., Sakh. Gen. distr.: Manchuria. Described from Okhotsk coast, Uyakon Bay. Type in Leningrad.

Note. According to the report of V. L. Komarov (l. c.), the Chinese relish this plant for food, cooking it together with millet. The same is reported by Miller (Dict. 1797).

4. **H. Dumortieri** Morren, Horticulteur Belge II (1834) 195; Baker. Journ. Lin. Soc. XI 359; Kom. Fl. Manchzh. I (1901) 439; Fl. Zabaikal. (1931) 148.— H. graminea β humilior Maxim. Prim. Fl. Amur (1859) 285.— Ic.: Morren l. c. tab. 43.

Perennial; leaves 14–18 mm broad, about equaling the stem; flowers 2 or 3, subsessile, very short-pediceled; yellow, fragrant; bracts broadly lanceolate, about equaling the pedicel; perianth 4.5–5.5 cm long, the tube 5–7 mm long; outer segments 9–11 mm broad, the inner 11–14 mm broad, obtuse, membranous-margined; root fibers with fleshy bulges. May.

E. Siberia: Dau.; Far East: Ze.-Bu., Okh. Gen. distr.: Manchuria, Japan. Described from Amur (Albazin V 1855, Maak).

5. **H. minor** Mill. Dict. (1797) No. 2; Kom., Fl. Manchzh. 458; Kom. and Alis., Opred. rast. Dal'nevost. kr. I (1931) 362; Fl. Zabaikal. (1931) 148.— H. graminea Andr. Bot. Rep. tab. 244; Kunth. Enum. IV, 588; Ldb. Fl. Ross. IV, 194; Maxim. Prim. Fl. Amur. (1859) 285.— H. graminifolia Schlecht. Abh. zu Halle, n. F., Bd. I Quart. III, 15.— H. pumila Salisb. Genera, p. 81.

Perennial; leaves shorter than to about equaling the stem, ca. 7 mm broad; inflorescence simple; pedicels ranging in length from 7 to 54 mm; flowers pale yellow, solitary or 2 or 3, fragrant, 7–9 cm long; outer perianth segments 9–11 mm broad, the inner ones broader and more obtuse, membranous-margined, sparsely anastomosing; bracts small, lanceolate; capsule oblong, ca. 3–5 mm long. June-July.

Water meadows, elevated wet places with sandy soil; forest glades, mountain slopes, and scrub.— W. Siberia: Ob; E. Siberia: Ang.-Say., Dau., Far East: Ze.-Bu., Uss. Gen. distr.: Manchuria, Japan, Korea, and N. China. Described from Siberia.

Subfamily 3. **Allioideae** ENGLER

Bulbose plants, rarely with short rhizomes; inflorescence a compound umbel consisting of abbreviated spirals, enclosed before opening in a spathe consisting of 2 broad, sometimes connate, more or less membranous leaves [bracts], these sometimes narrow or the inflorescence consisting of a solitary flower.

Key to Genera

1. Inflorescence of 1 or few flowers, covered in bud by narrow bracts; perianth yellow, rarely whitish or red . . . . . 266. **Gagea** Salisb.

+ Inflorescence a many-flowered capitate compound umbel, enclosed in bud within a membranous spathe; perianth rose, purple, white, or rarely yellow . . . . . 267. Allium L.

Genus 266. **GAGEA*** SALISB.**

in König u. Sims., Ann. of Bot. II (1806) 555.

Perianth segments 6, biseriate, yellow inside and lustrous, rarely whitish outside, commonly with a broad green dorsal band, sometimes reddish or dark purple, persistent in fruit, more or less indurescent and accrescent; stamens 6, inserted at base of perianth segments; anthers basifixed; capsule mostly 3-angled, 3-locular; seeds oblong-obovoid, terete or flat; bulbose herbs; inflorescence racemose-umbellate.

Economic importance. Species of the genus Gagea are of no economic importance. Massive development of these plants may often be observed in secondary habitats, especially in cultivated fields, so that they may be considered as weeds. However, in view of their small size and ephemeric character, as well as their flowering in early spring, they do not represent a serious menace as weeds.

1. Stigma 3-parted (Section Plecostigma (Turcz.) Pasher) . . . . . 2.
+ Stigma undivided, capitate . . . . . 3.
2. Stigma 3-parted to base; taller, plants with more southerly distribution (Altai, S. and E. Siberia) . . . . . 73. **G. pauciflora** Turcz.
+ Stigma parted only one-third the length; smaller plants with more northerly distribution (Yakutia, E. Siberia) . . . . . .74. **G. provisa** Pascher.

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3. Leaves differentiated into 1 or 2 radical leaves and the cauline leaves just below inflorescence [floral leaves], thus a long leafless portion of stem present between bulb and inflorescence (Section Nudiscaposae Terr., partly subgenus Platyspermum (Boiss.) Miscz.) . . . . . 4.
+ Leaves more or less uniformly distributed up the stem, alternate; distinct floral leaves absent (Section Foliatae Terr. and partly subgenus Platyspermum (Boiss.) Miscz.) . . . . . 54.
4. Bulbs 3, each in separate sheath, differing in size (Series Tribulbosae Terr., Subsection Dispathaceae Terr.) . . . . . 5.
+ Bulbs 1 or 2, in common sheath, or numerous small bulblets developing at base of bulb within the same sheath . . . . . 7.
5. Perianth segments 15–18 mm long, oblong, obtusish; plants commonly larger (Poland) . . . . . 37. **G. pratensis** (Pers.) Roem. et Schult.
+ Perianth segments 10–13 mm long, acute or obtuse; plants commonly smaller . . . . . 6.
6. Radical leaf linear, curved-undulate; perianth segments lanceolate, acute (Crimea) . . . . . 39. **G. transversalis** Stev.
+ Radical leaf linear-lanceolate, smooth; perianth segments oblong-linear, obtusish (W. and SW Ukraine) . . . . . 38. **G. Paczoskii** Zap.
7. Perianth segments attenuate-acuminate at apex, not cucullate, commonly grayish-yellow (Series Eureticulatae Pascher) . . . . . 8.

* Named for the English amateur botanist Thomas Gage, 1781–1820, who worked in Suffolk, Ireland, and Portugal.

** Arranged by A.A. Grossgeim.

+ Perianth segments not attenuate-acuminate, obtuse or obtusish or acute and then commonly more or less distinctly cucullate . . . . . 19.

8. Radical leaves flat, grasslike. . . . . 9.

+ Radical leaves narrow, 5-angled beneath . . . . . 11.

9. Perianth segments abruptly narrowed at apex and acuminate; high-mountain plants, 3–5 cm tall (Soviet Central Asia). . . . . 45. G. hissarica Lipsky

+ Perianth segments gradually and finely long-acuminate; plants of lowlands and the middle mountain zone . . . . . 10.

10. Perianth segments 14–20 mm long; larger plants (Turkmenia) . . . . . 43. G. rigida Boiss. et Sprun.

+ Perianth segments 8–12 mm long; smaller and more delicate plants (Sov. Centr. Asia) . . . . . 44. G. graminifolia Vved.

11. Bulblets present in axils of floral leaves (Centr. Asia) . . . . . 47. G. Bergii Litv.

+ No bulblets in axils of floral leaves . . . . . 12.

12. Pedicels at length arched-recurved (Centr. Asia) . . . . . 46. G. divaricata Rgl.

+ Fruiting pedicels erect . . . . . 13.

13. Collar above the bulb sheathing the lower part of stem, nearly reaching the inflorescence . . . . . 14.

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+ Collar above the bulb undeveloped . . . . . 16.

14. Bulb commonly with slender readily detachable white underground offshoots terminating in white bulblets; collar coarsely fibrous; radical leaf coarse, linear (Transc.) . . . . . 53. G. commutata C. Koch.

+ Underground offshoots none; radical leaf slender; collar finely reticulate . . . . . 15.

15. Radical leaf filiform; collar delicately reticulate; plants commonly in tufts . . . . . 55. G. tenuifolia (Boiss.) Fom.

+ Radical leaf narrowly linear; collar more coarsely reticulate; plants solitary . . . . . 54. G. reticulata (Pall.) Roem. et Schult.

16. Flowers and leaves commonly glabrous; perianth segments enlarged about the middle; plants of middle and upper mountain zones (Cauc., Turkm.?) . . . . . 17.

+ The outside of flowers, pedicels and leaves more or less pubescent; perianth segments gradually attenuate; plants of plains and lower mountain zone; bulb tunics not entwined in root fibers, fibrillose and ruptured at the top (Centr. Asia) . . . . . 52. G. pseudoreticulata Vved.

+ Bulb tunics densely entwined in root fibers . . . . . 18.

17. Radical leaf 1–3 mm broad; inflorescence 1–3-flowered; flowers 12–15 mm long . . . . . 50. G. Alexeenkoana Miscz.

+ Radical leaf 0.5–1 mm broad; flowers 10–11 mm long (S. Transc.). . . . . 51. G. Caroli-Kochii Grossh.

18. Root fibers slender; relatively delicate plants with thin leaves. . . . . 48. G. ucrainica Klokov.

+ Root fibers coarse, thick; relatively coarse plants, with delicate narrowly linear leaves . . . . . 49. G. taurica Stev.

19. Inflorescence subtended by one well developed floral leaf; other leaves in inflorescence inserted higher up, small, bractlike, or wanting (Subsection Unispathaceae Terr.) . . . . . 20.

+ Inflorescence commonly subtended by two floral leaves, of these one much longer than the other; other leaves in inflorescence, when present, small, bractlike, borne on pedicels (Subsection Unispathaceae Terr.). . . . . 33.

20. Perianth segments with saccate declined nectaries (Centr. Asia). . . . . 14. G. sacculifera Rgl.

+ Perianth segments never with saccate nectaries at base . . . . . 21.

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21. Radical leaves fistulous. . . . . 22.

+ Radical leaves flat, sometimes very narrow, linear, but not fistulous. . . . . 23.

22. Radical leaves 2, greatly overtopping the inflorescence; perianth segments pale yellow (Transc.) . . . . . 1. G. spathacea Salisb.

+ Radical leaf 1; perianth segments lemon-yellow (S. Transc.) . . . . . 2. G. Joannis Grossh.

23. Inflorescence compound, corymbose, with branched pedicels and strongly developed lower joint; flowers commonly numerous, small, 6–8 mm long; radical leaf 1; bulb solitary (Centr. Asia). . . . . 13. G. Popovii Vved.

+ Inflorescence umbellate; pedicels not branched, but usually with pronounced lower joint . . . . . 24.

24. A common sheath enclosing a large bulb and numerous small bulblets at its base . . . . . 25.

+ A common sheath enclosing two bulbs, one large, the other much smaller or sometimes absent . . . . . 26.

25. Bublets forming a ring around the base of the bulb; radical leaf lanceolate, broad (N. Siberia) . . . . . 4. G. granulosa Turcz.

+ Bulblets in a bundle on the side of the bulb; radical leaves narrowly linear (E. Siberia, Far East) . . . . . 5. G. hiensis Pascher.

26. Radical leaf narrowly linear, 1–2 or rarely up to 10 mm broad. . . . . 27.

+ Radical leaf lanceolate, flat, (5) 8–12 mm broad . . . . . 32.

27. Bulb solitary, oblong-ovoid; outer tunics fibrous, often reticulately split, produced into a short collar. . . . . 28.

+ Bulb ovoid; tunics coriaceous, not produced into a collar . . . . . 29.

28. Delicate and slender plants; flowers solitary or 2 or 3, pale yellow; perianth segments 6–8 mm long; bracts close to floral leaf and not separated from it by an internode (Turkmenia) . . . . . 11. G. kopetdagensis Vved.

+ Stronger and taller plants; flowers 3–7, bright yellow, violet-reddish on the outside; perianth segments 10–11 mm long; a pronounced internode present between floral leaf and bract (mountainous Tadzhikistan). . . . . 12. G. Korshinskyi Grossh.

29. Inflorescence one-third to one-half the length of stem; floral leaf markedly different from radical leaves, broadly lanceolate, 5–12 mm broad. . . . . 3. G. minima (L.) Ker-Gawl.

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+ Inflorescence two-thirds (rarely one-half) the length of stem; floral leaf not markedly differing in breadth from radical leaves; plants of Soviet Central Asia . . . . . 30.

30. Bulb solitary; radical leaf 1–1.5 mm broad; small, delicate plant 2–5 cm tall (mountainous Tadzhikistan) . . . . . 10. G. minuta Grossh.

+ Bulbs 2, rarely the smaller second bulb abortive; radical leaf 1.5–2 to 10 mm broad . . . . . 31.

31. A small plant, 3–7 cm tall; radical leaf 1–2 or rarely to 5 mm broad; perianth segments to 10 mm long (SW Siberia, Tien Shan) . . . . . 9. **G. filiformis** (Ldb.) Kunth.

+ A larger plant, up to 20 cm tall; radical leaf to 10 mm broad; perianth segments 14–16 mm long (mountains of Soviet Central Asia) . . . . . 8. **G. pseudoerubescens** Pascher.

32. Stem strong; inflorescence branches flexuous-geniculate (Centr. Asia). . . . . 7. **G. dshungarica** Rgl.

+ Stem slender; inflorescence branches not flexuous (S. Transc., Mtn. Turkm.) . . . . . 6. **G. confusa** Terr.

33. Bulb 1 (Series Unibulbosae Terr.) . . . . . 34.

+ Bulbs 2, one large, giving rise to leaf, the other giving rise to stem, small, situated on the side of the larger bulb (Series Dibulbosae Terr.) . . . . . 44.

34. Radical leaf hollow, triquetrous, with cylindric cavity (Centr. Asia). . . . . 25. **C. triquetra** Vved.

+ Radical leaf not hollow, flat or carinate . . . . . 35.

35. Radical leaf linear to broadly linear, to 5–7 mm broad, narrowly linear, ecarinate . . . . . 36.

+ Radical leaf narrowly linear, distinctly carinate, canaliculate above. . . . . 39.

36. Radical leaf 7–10 (to 15) mm broad, long, abruptly attenuate at apex, minutely cucullate; flowers to 18 mm long . . . . . 15. **G. lutea** (L.) Ker-Gawl.

+ Radical leaf mostly narrower; flowers smaller . . . . . 37.

37. Stem 8–10 times as long as inflorescence; fruiting pedicels not recurved (Siberia, Far East) . . . . . 17. **G. longiscapa** Grossh.

+ Stem 3–4 times as long as inflorescence . . . . . 38.

38. Fruiting pedicels arched-recurved . . . . . 16. **G. erubescens** Bess.

+ Fruiting pedicels obliquely ascending (Caucasus) . . . . . 18. **G. Helenae** Grossh.

66 39. Plants pruinose throughout, the bloom rubbing off easily; radical leaf 2–3 (4) mm broad; floral leaf and pedicels commonly pubescent (Caucasus) . . . . . 23. **G. Chanae** Grossh.

+ Plants shining or dull green, without bloom . . . . . 40.

40. Flowering pedicels as long as or slightly longer than the flowers; flowers few, 8 mm long; stems slender, 3–9 cm long (N. part of Centr. Asia) . . . . . 20. **G. Fedtschenkoana** Pascher.

+ Flowering pedicels longer than and sometimes several times the length of flowers . . . . . 41.

41. Perianth segments enlarged in upper one-third, attenuate toward apex, obtusish, yellow tinged with orange; green lustrous plants (Crimea, Caucasus) . . . . . 24. **G. Germainae** Grossh.

+ Perianth segments oblong-linear, not attenuate, yellow, not tinged with orange . . . . . 42.

42. Perianth segments to 19 mm long; lower floral leaf distinctly 3-nerved on the back; stems to 20 cm long (N. part of Centr. Asia) . . . . . 21. **G. Capusii** Terr.

+ Perianth segments 8–12 mm long . . . . . 43.
43. Bulb tunics light brown . . . . 19. G. pusilla (Schmidt) Roem. et Schult.
+ Bulb tunics dark tawny-brown (Centr. Asia) . . . . . 22. G. parva Vved.
44. Radical leaf fistulous, solitary or radial leaves 2 (Subsection Fistulosae Terr.) . . . . . 45.
+ Radical leaves not fistulous, semicylindric, canaliculate above (Subsection Arvenses Terr.) . . . . . 51.
45. Perianth segments very obtuse, scarcely attenuate toward apex, 15–20 mm long; radical leaves mostly 2 (Crimea) . . . . . 26. G. fistulosa Ker-Gawl.
+ Perianth segments lance-elliptic, more or less attenuate toward apex; radical leaf mostly solitary . . . . . 46.
46. Perianth segments 8–10 (12) mm long . . . . . 47.
+ Perianth segments 12–15 mm long . . . . . 48.
47. Pedicels densely pubescent; flowers 2–4, bright sulfureous . . . . . 30. G. sulfurea Miscz.
+ Pedicels glabrous or slightly pubescent; flowers 1 or 2 (rarely 3), lemon-yellow . . . . . 29. G. glacialis C. Koch.
48. Inflorescence 1- or 2- (3)-flowered; perianth segments obtuse, slightly attenuate toward apex, bright yellow; floral leaves always shorter than inflorescence; bulb tunics gray (N. Urals) . . . . . 27. G. samojedorum Grossh.
+ Inflorescence commonly many-flowered, but depauperate in some forms; perianth segments acutish or rarely obtusish . . . . . 49.
49. Perianth segments emarginate or obliquely truncate, always more or less obtusish (Centr. Asia) . . . . . 31. G. emarginata Kar. et Kir.
+ Perianth segments never emarginate, tapering toward apex, acutish or rarely obtusish . . . . . 50.
50. Plants of N. Kazakhstan and Transvolga area; bulb tunics tawny-brown; stem, radical leaf and pedicels thick, coarse . . . . . 32. G. mirabilis Grossh.
+ Plants of high mountains of Caucasus and Transcaucasia; bulb tunics commonly light brown, rarely dark brown; stem, radical leaf and pedicels slender. . . . . 28. G. anisanthos C. Koch.
51. Radical leaves filiform, greatly overtopping the inflorescence; perianth segments very obtuse, bright yellow (former Artvin area). . . . . 33. G. tenuissima Miscz.
+ Radical leaves narrowly linear or flat; perianth segments more or less tapering toward apex . . . . . 52.
52. Radical leaves flat, 3–5 mm broad; low depressed many-flowered plants; inflorescence commonly as long as or shorter than the stem; bulblets usually produced at base of floral leaves; perianth segments obtuse, bright golden-yellow (Crimea). . . . . 36. G. Granatelli Parl.
+ Radical leaves narrowly linear, carinate beneath, canaliculate above; inflorescence commonly 2–3 (and more) times as long as the stem; perianth segments subacute, yellow. . . . . 53.
53. Perianth segments 15–16 mm long, long-attenuate acuminate, reflexed at the tip. . . . . 34. G. arvensis Dum.
+ Perianth segments ca. 12–14 mm long, slightly acuminate or obtusish, the tip not recurved . . . . . 35. G. dubia Terr.

54. Ovary pyriform, narrowed at base into a distinct stipe (Subsection Stipitatae Pascher) . . . . . 55.
\+ Ovary exstipitate, ovoid . . . . . 59.
55. Bulblets present (rarely wanting) in the axils of upper leaves; slender small-flowered plants (Centr. Asia) . . . . . 71. **G. gageoides** (Zucc.) Vved.
\+ Bulblets in leaf axils wanting . . . . . 56.
56. Perianth segments 4–5 mm long; floral leaf broad; plants 3–5 cm tall, rarely taller (Centr. Asia) . . . . . 72. **G. minutiflora** Rgl.
68 \+ Perianth segments relatively long; floral leaf narrowly linear; mostly taller plants . . . . . 57.
57. Radical leaves slenderly capillary; cauline leaves somewhat broader, flowers few (1 or 2, rarely 3) (Centr. Asia) . . . . . 70. **G. capillifolia** Vved.
\+ Radical leaves coarser, narrowly linear; flowers commonly numerous. . . . . 58.
58. Flowers pale yellow; stipe of ovary and of capsule indistinct; secondary bulblets faveolate-pitted (Centr. Asia) . . . . . 69. **G. ova** Stapf.
\+ Flowers golden-yellow; ovary and capsule distinctly stipitate; secondary bulblets none or, if present, then minutely papillose (S. Transc., Centr. Asia) . . . . . 68. **G. stipitata** Merkl.
59. Seeds cylindric (Section Foliatae Terr.) . . . . . 60.
\+ Seeds flat (Series Euchloranthae) . . . . . 62.
60. Perianth segments narrowed upward, obtusish, relatively small; pedicels long (Crimea) . . . . . 42. **G. Heldreichii** Terr.
\+ Perianth segments enlarged upward (spatulate), very obtuse, relatively large; pedicels very short . . . . . 61.
61. Taller plants, 3–6-flowered (S. Ukraine) . . . . 40. **G. Szovitsii** Bess.
\+ Usually very low plants, with 1, rarely 2 or 3 flowers (Crimea). . . . . 41. **G. Callieri** Pascher.
62. Lower leaf fistulous . . . . . 63.
\+ Lower leaves not fistulous . . . . . 64.
63. Bulbs 2, one larger, the other smaller, in a common sheath; tunics blackish-brown (Centr. Asia) . . . . . 57. **G. Chomutovae** Pascher.
\+ Bulb 1, with a compact lateral bundle of small bulblets within the same sheath; tunics light blackish to tawny-brown (S. Transc.) . . . . . 56. **G. improvisa** Grossh,
64. Bulb produced into a rather long collar . . . . . 65.
\+ Collar wanting or obsolescent . . . . . 68.
65. Collar long, reaching to or above the middle of stem, coarse; perianth segments 10–12 mm long, obtuse (S. part of Centr. Asia). . . . . 60. **G. Alberti** Rgl.
\+ Collar short, usually not exceeding 1 cm in height . . . . . 66.
66. Upper cauline leaves very short, slenderly filiform, with bulblets in their axils, differing markedly from the radical and lower cauline nonbulbilliferous leaves . . . . . 66. **G. pamirica** Grossh.
69 \+ Transition from lower to upper leaves gradual; no bulblets in the axils of upper leaves . . . . . 67.
67. Commonly glabrous, bright green plants; radical leaf greatly overtopping the inflorescence; perianth segments golden-yellow (S. Siberia) . . . . . 64. **G. altaica** Schischk. et Sumn.

+ Puberulent, dull green plants; radical leaf greatly overtopping the inflorescence; perianth segments dull almost greenish yellow. (Kopet Dagh) . . . . . 59. **G. anisopoda** M. Pop.

68. Bulblets formed in the axils of cauline leaves . . . . . 65. **G. bulbifera** (Pall.) Roem. et Schult.

+ No bulblets in leaf axils . . . . . 69.

69. Bulb tunics fibrous, readily separating into fibers . . . . . 66.

+ Bulb tunics firm, coriaceous . . . . . 72.

70. Flowers light nearly whitish yellow; perianth segments 9–15 mm long, enlarged in upper one-third, acute or subacuminate (S. part of Centr. Asia) . . . . . 63. **G. Vvedenskyi** Grossh.

+ Flowers bright yellow or golden-yellow; perianth segments obtusish. . . . . 71.

71. Inflorescence few-flowered; perianth segments golden-yellow, 5–9 mm long (Centr. Asia) . . . . . 61. **G. Olgae** Rgl.

+ Inflorescence few-flowered; perianth segments yellow, 9–12 mm long (S. part of Centr. Asia) . . . . . 62. **G. afghanica** Terr.

72. Lower cauline leaves flat, enlarged at base; radical leaves commonly 2, filiform; perianth segments not accrescent . . . . . 67. **G. tenera** Pascher.

+ Lower cauline leaves narrowly linear; radical leaf mostly 1; perianth segments mostly strongly accrescent after anthesis. . . . . 58. **G. chlorantha** (M. B.) Roem. et Schult.

Subgenus I. **EUGACEA** Pascher in Lotos, N. F., XXXIV (1904) 110.— Seeds globose, subhorizontal [?], with pale or tawny testa, slightly furrowed longitudinally.

Section 1. **NUDISCAPOSAE** Terr. in Mém. 2 Soc. Bot. France (1905) 11.— Stem leafless from base to inflorescence, except for 1 or 2 floral leaves subtending the inflorescence; inflorescence subumbelliform.

Subsection 1. UNISPATHACEAE Terr. in Bull. Herb. Boiss. V (1905) 1064.— Floral leaf 1; inflorescence commonly jointed at base, branched; a small secondary bulb or numerous small bulblets produced in addition to main bulb or sometimes the bulb solitary.

Series **Euspathaceae** Terr. in Bull. Herb. Boiss. V (1905) 1064.—
70 Umbel simple, peduncled; floral leaf distant from inflorescence; radical leaves fistulous; perianth segments lanceolate, obtusish, whitish or rose.

1. **G. spathacea** (Hayne) Salisb. in Koenig et Sims. Annals Bot., II (1806) 556; Ldb. Fl. Ross. IV, 140, p. p.— *Ornithogalum spathaceum* Hayne in Ust., Ann. Bot. XXI (1797) 11.— Ic.: Redouté Liliaceae, t. 242; Rchb. Ic. No. 1039 (1848); Hegi Illust. Fl. d. Mitteleuropa II, 209, f. 330.— Exs.: Fl. exs. Reipubl. Boh.-Slov. No. 597.

Perennial; bulbs 2, one much larger than the other; tunics grayish, membranous; stem glabrous, 6–20 cm long; radical leaves 2, very long, greatly overtopping the stem, narrowly linear, fistulous, flat or slightly concave above, convex beneath; floral leaf oblong-lanceolate, 6–9 mm broad at base, cucullate, equaling or shorter than inflorescence; inflorescence with internode, 2–4-flowered; pedicels short-bracteolate; perianth segments elongate-lanceolate, obtuse, lemon-yellow, green outside, 10–13 mm long; stamens half the length of perianth; anthers oblong; ovary subglobose. April-May. (Plate VI, Figure 3, a, b).

Shady woods and scrub.— European part: U.V., U. Dnp. (rare). **Gen. distr.**: Scand, Centr. Eur., Atl. Eur. Described from England. Type in London (?).

2. G. **Joannis** Grossh. sp. nova in Addenda III, p. 734; tab. XLIV, figure 2, a-c.

Perennial; bulb ovoid, medium size; secondary bulb small, commonly darkish, foveolate-rugulose, brown; stem 3–5 cm long, weak; radical leaf solitary, half as long again as inflorescence; narrowly linear, 1.5–2 mm in diameter, fistulous; floral leaf 1, lanceolate, shorter than to equaling the inflorescence; upper leaves very small, linear-subulate; inflorescence branched, few-flowered; pedicels slender, 2–3 times the length of flower; perianth segments yellow, faintly greenish outside, 2–10 mm long, oblong-lanceolate, obtuse or subobtuse; stamens half the length of perianth segments; anthers very small, rounded-ovoid; capsule oblong-obovoid, one-third shorter than perianth segments. June. (Plate VI, Figure 15, a, b).

Meadows and near melting snow. Type in Baku.

Series **Minimae** Terr., Bull. Herb. Boiss. V (1905) 1064.— Inflorescence branched; pedicels bracteolate; radical leaves not fistulous; radical leaf commonly 1, narrow; perianth segments acute or subacute, sometimes ciliate at base.

Cycle **Euminimae** Terr., Bull. de l'herb. Boiss. V (1905) 1064.— Radical leaf solitary, linear to narrowly lanceolate, flattish, erect.

3. **G. minima** (L.) Ker-Gawl. in Journ. Roy Inst. I (1816) 180; Miscz., Fl. Cauc. cr. II, 4 (1912) 146; Kryl., Fl. Zap. Sib. III (1929) 594.—
71 G. minima Schult., Ldb. Fl. Ross. IV (1053) 639; Boiss. Fl. Or. V (1884) 207; Shmal'g., Fl. II, 503.— Ornithogalum minimum L. Sp. pl. (1753) 306.— Ic.: Rchb. Ic. Fl. Germ. (1848) t. 1040; Syreishch., Ill. Fl. Mosk. gub. (1906) 234.— Exs.: Herb. norm. edit. ab Dörfler. No. 5187; Fl. exs. Austro-Hung. No. 3, 489; HFR, No. 923.

Perennial; bulbs 2, very unequal, in common sheath of brown scales; stem glabrous, 7–15 cm long, or up to 20 cm (v. robusta Piotrovski); radical leaf solitary, narrowly linear, flat to subcanaliculate, narrowed at both ends, 1–3 mm broad; lower internode floriferous, usually distinct, to 2 cm long; pedicels slender, long, with a minute bracteole at base, glabrous or with scattered pubescence (v. rufula Terr.); perianth segments yellow or whitish (v. albiflora Zinger), greenish or somewhat

rufous outside (v. rufula Terr.), 10–15 mm long, linear-lanceolate to oblong, acuminate; stamens one-half to two-thirds the length of perianth, broadly elliptical; capsule obovoid. April-May. (Plate VI, Figure 9).

Woods, scrub, wood margins, and rarely meadows. — European part: Dv.-Pech., Lad.-Ilm., U.V., V.-Ka., U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim., L. Don; Caucasus: Cisc.; W. Siberia: U. Tob. **Gen. distr.**: Scand., Centr. Eur., Bal.-As. Min. Described from Europe. Type in London.

4. **G. granulosa** Turcz. in Bull. Soc. Nat. Moscou, t. XXVII, No. 3. (1854) 112; Kryl., Fl. Zap. Sib., pt. 3 (1929) 596. — G. rufescens Rgl. Ind. Sem. Hort. Petrop. (1862) 28. — G. minima v. paradoxa (an species nova) S. Illitschevsky, Flora okolits' Poltavy (1927) 28. — G. granulosa v. septentrionalis Perf. Nov. vidy i razn. gus. luka. Mater. po izuch. i ispol'z. proiz. sil Sev. Kraya, pt. III (1921). — G. borealis Perf. ibid. — G. granulosa v. elatior Pascher Bull. Soc. Nat, Moscou. XIV (1907) 358. — Ic.: Perfil'ev, Journ. Soc. Bot. Russie. XII, pt. 3 (1927) 247.

Perennial; bulb subglobose-ovoid, 5–6 mm in diameter, a ring of numerous small bulblets at base inclosed within a common sheath; tunics dark brown; stem 10–30 cm long, slender, whitish at base; inflorescence sometimes with a strongly developed internode (v. borealis (Perf.) Sch.); radical leaf solitary, green, glabrous, flat, 4–9 mm broad, tapering at both ends, narrowly cucullate, 1.5 cm long; lower floral leaf 6–10 mm broad, with a narrow hood 2–3 cm long; second leaf subopposite, much shorter than narrower; inflorescence 1–5-flowered; pedicels unequal; perianth segments yellow, green- or rufous-striped on the outside, 12–18 mm long, lanceolate, attenuate upward, obtusish, rarely enlarged at apex and rounded-obtusish (v. septentrionalis Perf.). April-May-June. (Plate VI, Figures 4, a–c, 5).

72 Woods and scrub. — Arctic: Arc. Eur.; European part: Dv.-Pech., Lad.-Ilm., U.V., V.-Ka., U. Dnp., M. Dnp. (Poltava), V.-Don. (Kharkov); W. Siberia: Ob, Irt., Alt.; E. Siberia: Ang.-Say. Endemic. Described from [former] Tomsk Province. Type in Kharkov.

5. **G. hiensis** Pascher in Lotos (1904) 126. — G. Terraccianoana Pascher in Fedde, Repert. sp. nov. II (1906) 58.

Perianth; bulb medium size, ovoid, with a crowded sublateral bundle of small bulblets; tunics gray or brownish; stem 8–15 cm long, slender; inflorescence (one-sixth) one-fourth to one-third the length of stem; radical leaf solitary, flat, narrowly linear, 0.75–1.5 (2–3) mm broad, overtopping the inflorescence; floral leaf narrowly lanceolate; inflorescence 2–8-flowered; pedicels slender, 3–4 times the length of flower; perianth segments 6–9 (10) mm long, narrowly lanceolate, the outer slightly tapering, acute, pale yellow within, greenish outside. April-May. (Plate VI, Figure 6 a, b).

Grassy slopes and bottomland woods. — E. Siberia: Dau.; Far East: Ze.-Bu., Uss. Endemic. Described from Dauria (?). Type in Leningrad.

Note. In his description, Pascher reports this species from Central Asia, while in a later publication he records it from Altai and Manchuria.

Plate VI

1. Gagea sacculifera Rgl.: flower in side view.— 2. G. dshungarica Rgl.: 2a) perianth segments.— 3. G. spathacea (Hayne) Salisb.: 3a) perianth segments; 3b) cross section of leaf.— 4. G. granulosa Turcz.: 1) bulb; b) radical leaf; c) perianth segments.— 5. G. granulosa var. borealis (Perf.) B. Schischk.: inflorescence.— 6. G. hiensis Pascher: a) bulb; b) perianth segments.— 7. G. minuta Grossh.— 8. G. confusa Terr.: perianth segments.— 9. G. minima (L.) Ker. Gawl.: perianth segments.— 10. G. lutea (L.) Ker-Gawl.: a) radical leaf; b) inflorescence of var. Komarovi Grossh.— 11. G. erubescens Bess.: fruiting; a) perianth segments; b) cross section of radical leaf.— 12. G. Helenae Grossh.: a) cross section of radical leaf; b) perianth segments.— 13. G. pseudoerubescens Pascher· a) cross section of radical leaf; b) perianth segments.— 14. G. Fedtschenkoana Pascher, perianth segments.— 15. G. Joannis Grossh.: a) cross section of radical leaf; b) perianth segments.— 16. G. kopetdaghensis Vved.: bulb.— 17. G. Korshinskyi Grossh.: bulb.— 18. G. pamirica Grossh.— 19. G. Vvedenskyi Grossh.: perianth segments.

The original specimen, however, by which G. hiensis was established, originates, according to the label, from Dauria. This is the only herbarium specimen with Pascher's label. The later described G. Terraccianoana does not differ in any way from these samples which also have a lateral bundle of bulblets, a characteristic overlooked by Pascher and left out of his description. For this reason G. hiensis and the later described G. Terraccianoana were placed by Pascher in different parts of his system of the genus.

Cycle **Minimoides** Terr., Bull. Herb. Boiss. V (1905) 1064. — Radical leaf broadly lanceolate, flat, acute.

75 6. **G. confusa** Terr. Bull. Soc. Ort. Palermo II (1904) 35; Miscz., Fl. Cauc. cr. II, 4 (1912) 147. — G. minimoides Pascher, Lotos (1904) 124. — Exs.: Pl. orient. exs. No. 54.

Perennial; bulb large, with several small blackish-brown bulblets, inclosed within common brown tunics; stem glabrous, 8–15 cm long; radical leaf solitary, broadly linear, narrowed at both ends, flat, ca. 8–12 mm broad, the middle part slightly exceeding the inflorescence; floral leaf lanceolate, decurrent, to 10 mm broad, equaling or slightly exceeding the inflorescence; upper leaves few, narrowly linear, short; inflorescence few-flowered; pedicels long, slender; perianth segments pale yellow, green on the outer face, 9–13 mm long, oblong-linear, obtusish; stamens one-third to one-half the length of perianth; anthers very small, ovaloid; ovary obovoid, trigonous. April-May. (Plate VI, Figure 8).

Grassy mountain slopes, 1000–3000 m. — Caucasus: E. Transc., Tal.; Centr. Asia: Mtn. Turkm. **Gen. distr.**: Iran. Described from Iran. Type in Geneva.

7. **G. dshungarica** Rgl. in A.H.P. VI (1879) 513.

Perennial; bulb large, with numerous small pale bulblets within a common sheath; bulb ovoid; tunics firm, grayish-rufous; stem firm. glabrous, 5–15 cm long; radical leaf solitary, narrowed into a long petiole, linear-lanceolate, attenuate toward apex, 4–6 mm broad; floral leaf resembling the radical, lanceolate to lance-linear, tapering, acuminate, to 4–5 mm broad, commonly shorter than inflorescence; upper leaves rather numerous, much smaller, linear to narrowly lanceolate; inflorescence many-flowered, branched, the rachis and branches flexuous; pedicels medium length, 2–3 times the length of flower; perianth segments pale yellow, greenish-yellow on outer face, 6–8 mm long, oblong-linear, obtuse; stamens one-third shorter than perianth; anthers rounded-ovaloid. May-June. (Plate VI, Figure 2a).

Grassy mountain slopes, at 2000-3500 m. — Centr. Asia: Mtn. Turkm., Pam.-Al., T. Sh., Dzu.-Tarb. Endemic. Described from Dzungarian Ala Tau. Type in Leningrad.

Cycle **Filiformes** Grossh. — Radical leaf solitary, flat, narrowly linear or lanceolate; inflorescence slightly shorter than to equaling the stem; fruiting pedicels stellately spreading.

8. G. pseudoerubescens Pascher in Fedde, Repert. sp. nov. II (1906) 67. — G. filiformis var. pseudogranulosa Pascher in Bull. Soc. Nat. Moscou XIX (1907) 359.

Perennial; bulbs 2, one large, the other smaller, giving rise to the stem; bulb tunics blackish-brown, subcoriaceous; stem 10–20 (35) cm long, weak; radical leaf solitary, commonly exceeding the stem flat, linear, 5–10 mm broad (to 12–13 mm — v. latifolia Grossh.), narrowed at both
76 ends; floral leaf lanceolate, to 15 mm broad at base, long-acuminate, equaling or slightly exceeding the stem; next leaf subopposite, minute; pedicels sometimes minutely bracteolate; inflorescence many-flowered, one-half to two-thirds as long to nearly as long as the stem; pedicels slender, many times the length of flower, substellately spreading in fruit; perianth segments 8–12 mm long, pale yellow, green outside, acute, the inner ones obtusish; stamens one-third the length of perianth; anthers minute, rounded. April-May. (Plate VI, Figure 13, a, b).

Mountain meadows. — Centr. Asia: Dzu.-Tarb., Pam.-Al., T. Sh. **Gen. distr.**: India (?). Described from Soviet Central Asia. Type in Leningrad.

9. **G. filiformis** (Ldb.) Kunth, Enumer. IV (1848) 237; Ldb. Fl. Ross., IV, 139; Kryl., Fl. Zap. Sib. III, 600. — Ornithogalum filiforme Ldb. Ic. pl. Fl. Ross. IV (1833) 28. — Ic.: Ldb., ibid., t. 392; Rchb. Ic. Fl. Germ. (1843) No. 1046.

Perianth; bulbs 2, one large, the other lateral, very small, giving rise to the stem; bulb tunics blackish-brown, coriaceous, slightly fibrillose at the top; stem slender, 5–10 cm long; radical leaf solitary, pale green, flat, tapering at both ends, narrowly linear, 1–3 mm broad (typical form — var. Ledebouriana Pascher) or to 7 mm broad (var. Regeliana Pascher); floral leaf commonly broader than the radical, narrowly lanceolate, tapering, acuminate, 5–7 mm broad at base, mostly shorter than to equaling the inflorescence; next leaf subopposite, minute, narrowly linear; pedicels sometimes minutely bracteolate; inflorescence equaling or slightly shorter than the remaining part of stem; pedicels rather few, slender, much longer than flower, spreading after anthesis; perianth segments pale yellow, 8–10 mm long, the outer acutish, the inner obtusish, or all segments obtuse (var. obtusata Pascher.); stamens one-third shorter than perianth; anthers small, rounded. April-May.

Slopes. — W. Siberia: Irt., Alt.; Centr. Asia: Balkh., Dzu.-Tarb. (?), Syr D., Pam.-Al., T. Sh. **Gen. distr.**: Iran. Described from W. Siberia (Bukhtarminsk). Type in Leningrad.

10. **G. minuta** Grossh. sp. nova. in Addenda III, p. 734.

Perennial; bulb small, solitary, ovoid, covered with dark brown membranous tunics; stem 2–5 cm long, slender, delicate; radical leaf solitary, subcapillary-linear to linear, slightly enlarged toward base; floral leaf to 3–4 mm broad, shorter than to equaling the inflorescence; upper leaf much shorter, narrowly linear, the internode between the two leaves sometimes obsolescent; flower solitary or inflorescence 3–4-flowered; pedicels slender, unequal, 2–3 times the length of flower, slightly crisp-haired to glabrate; perianth segments 7–9 mm long, narrowly lanceolate, acute to subacute, pale yellow within, greenish outside; stamens one-third

to one-half the length of perianth; anthers one-third to one-half shorter than perianth; anthers small, subglobose-ovaloid. March-April. (Plate VI, Figure 7).

77 Slopes in the middle mountain zone, at 600–1800 m. — Centr. Asia: Pam.-Al. Endemic. Described from Tadzhikistan. Type in Leningrad.

Cycle **Reticulatoides** Grossh. — Bulb tunics forming a short collar, reticulate-fibrillose in upper part; radical leaf solitary, narrowly linear.

11. **G. kopetdagensis** Vved. in Fl. Turkm. I, 2 (1932) 260. — Ic.: l. c. (1932) 102.

Perennial; bulb small, solitary; inner tunics coriaceous; outer tunics coriaceous-fibrous gray, produced into a very short collar, oblong-ovoid, 15–18 cm long; stem 6–8 cm long, slender; radical leaf subcapillary-linear, 1–1.5 mm broad, about twice the length of inflorence; floral leaves 2, approximate, the lower narrowly linear, ca. 1.5 mm broad, about twice the length of inflorescence; upper leaves much smaller; inflorescence 2- or 3-flowered; pedicels slender, glabrous, erect, twice the length of flower or longer; perianth segments oblong-lanceolate, obtuse, 6–8 mm long, pale yellow, scarcely green-tinged outside, distinctly 3-nerved; stamens one-third shorter than perianth. July. (Plate VI, Figure 16a).

Near melting snow in the high mountain zone. — Centr. Asia: Mtn. Turkm. Endemic. (probably growing in Iran). Described from Kopet Dagh. Type in Leningrad.

12. **G. Korshinskyi** Grossh. sp. nova in Addenda III, p. 735.

Perennial; bulb small, solitary, oblong-ovate, giving rise to cauline leaf, covered with a firm white sheath; inner tunics numerous, gray, membranous, outer tunics reticulate-fibrous, produced into a collar 15–18 cm long; stem 8–15 cm long; radical leaf solitary, exceeding the inflorescence, narrowly linear, ca. 2 mm broad, canaliculate above; floral leaf solitary, narrowly linear, scarcely enlarged toward base, shorter than inflorescence; upper leaves strongly abbreviated, passing into bracts; upper leaves and pedicels crisp-haired; inflorescence branched, 2–7-flowered; pedicels erect, unequal, twice the length of flower or longer; perianth segments oblong-lanceolate, attenuate toward apex, the outer face dull violet-reddish. May-June. (Plate VI, Figure 17).

Stony slopes in the upper mountain zone. — Centr. Asia: Pam.-Al. Endemic. Described from Darvaz. Type in Leningrad.

Cycle **Corymbosae** Grossh. — Radical leaf solitary, narrowly linear; inflorescence strongly branched, many-flowered.

13. **G. Popovii** Vved. in Opred. rast. okr. Tashkenta (1923) 62; Herbarium Florae Asiae Med. No. 54 (1925). — Ic.: Opred. l. c., Figure 92. Exs. - l. c.

78 Perennial; bulb-ovoid-subglobose, 8–10 mm long; secondary bulb very small; sheaths coriaceous, dark tawny; stem 5–15 cm long; stem and leaves cineraceous-green; radical leaf solitary, exceeding the inflorescence,

narrowly linear; floral leaf overtopping the inflorescence, narrowly lanceolate; upper leaves minute, bractlike, inflorescence many-flowered, irregularly branched, corymbose, fairly dense; pedicels slender, unequal longer than flower, covered with short crisp hairs; perianth segments 6–8 mm long, linear-oblong, obtuse, yellow within, grayish-green and minutely crisp-haired outside; capsule obovoid, half as long again as the perianth. March-April. (Plate VII, Figure 11).

Gravelly and loess slopes in the foothills. — Centr. Asia: Syr D. Endemic. Described from the vicinity of Tashkent. Type in Tashkent.

Cycle **Sacculiferae** Grossh. — Perianth segments saccate at base.

14. **G. sacculifera** Rgl. in A.H.P. VI (1879) 510.

Perennial; bulb ovoid-subglobose, covered with blackish tunics; stem 5–10 cm long; radical leaf 1, erect, about equaling or slightly exceeding the inflorescence, narrowly linear; floral leaf linear-lanceolate, equaling or exceeding the flowers; inflorescence 3–5-flowered; pedicels unequal, bracteolate; perianth segments 10–12 mm long, oblong, obtuse, with a sacciform obtuse downward pointing appendage at base. April. (Plate VI, Figure 1).

Mountains. — Centr. Asia: Dzu.-Tarb. Endemic (probably occurring also in Dzu.-Kash.). Described from Kuldja. Type in Leningrad.

Subsection II. DISPATHACEAE Terr., in Mém. 2 Soc. Bot. de France (1905) 12. — Floral leaves 2, opposite, one longer than the other.

Series **Unibulbosae** Terr. in Mém. 2 Soc. Bot. de France (1905) 12. — Bulb 1; radical leaf 1; stem lateral.

Cycle **Silvaticae** Terr. in Bolet. Soc. Aragonens. Cienc. Natur. IV (1905) 218. — Radical leaf flat, linear to linear-lanceolate, ecarinate, distinctly nerved; capsule globose.

15. **G. lutea** (L.) Ker.-Gawl. in Curt. Bot. Mag., (1809) tab. 1200; Ldb. Fl. Ross. IV, 138; Boiss. Fl. Or. V, 267; Shmal'g., Fl. II, 503. — Ornithogalum luteum L. Sp. pl. (1753) 506, p.p. — G. silvatica Loud. Hort. Britann. (1830) 134; Miscz., Fl. cauc.-cr. II, 4 (1912) 148. — Ic.: Bot. Mag. t. 1200; Syreish. Ill. Fl. Mosk. gub. I (1906) 233. — Exs.: Hayek. Fl. stir. exs. No. 410; Fl. Exs. austro-hungar. No. 3486; HFR No. 1192.

Perennial; bulb medium size, oblong-ovoid, covered with grayish-brown tunics; stem 10–30 cm long; radical leaf flat, broadly lanceolate, 7–15 mm broad, rather abruptly tapering toward apex, cucullate, exceeding the inflorescence; floral leaves 2, unequal, the lower lanceolate, commonly
79 exceeding the inflorescence, the other smaller, linear-lanceolate to linear, commonly shorter than inflorescence; sometimes subfloral internode developed, 6–10 mm long (v. Komarowi Grossh. — Kamchatka); inflorescence 8–10-flowered; pedicels unequal, glabrous or hairy

(v. australis Terr.); perianth segments 13–18 mm long, lanceolate, obtuse, pale yellow, green outside; stamens about half the length of perianth; capsule subglobose, shorter than perianth. March-April.

Woods, groves, and dense scrub. — European part: Dv.-Pech., Lad.-Ilm., U. V., V.-Ka., U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim., L. Don; Caucasus: Cisc., E. Transc.; W. Siberia: Irt., Alt.; E. Siberia: Ang.-Say. (rare); East East: Kamch., Ze.-Bu., Uda, Uss., Sakh. **Gen. distr.**: Scand., Centr. and Atl. Eur., Jap.-Ch. Described from England. Type in London.

16. **G. erubescens** Besser in Roem. et Schult. Syst. VII (1829) 545; Ldb. Fl. Ross. IV, 141; Shmal'g., Fl. II, 504. — Ornithogalum erubescens Besser, Enum. 45 (1822) No. 1390. — G. rubicunda Meinsh. Fl. ingr. (1878) 352. — G. reflexa Czern., Consp. pl. Charcov. (1859) 64 in nota. — G. cretacea Sukatschev in schedis. — Ic.: Syreishch., Fl. Mosk. gub. I (1906) 233. — Exs.: HFR No. 740.

Perennial; bulb ovoid, medium size, covered with brown tunics; stem 8–18 cm long; radical leaf narrowly linear to linear, flat, ecarinate, 2–5 mm broad, 3-nerved beneath, exceeding the inflorescence; floral leaves 2, sometimes with an internode 4–5 mm long, the lower equaling the flower, narrowly linear, the other shorter; inflorescence 3–15-flowered, rarely 3–5-flowered (v. Czernjaevi Alech.); pedicels unequal, glabrous or slightly ciliate-pubescent, arched-recurved in fruit; perianth segments 11–13 mm long, lanceolate, acuminate, yellow within, green or reddish outside; stamens one-third shorter than perianth; capsule subglobose, concave at the top, half the length of perianth. March-April. (Plate VI, Figure 11 a, b).

European part: Lad.-Ilm., U. V., V.-Ka. (rare), U. Dnp., M. Dnp. V.-Don, Bl., L. Don (rare). **Gen. distr.**: Centr. Eur. Described from S. Podolia. Type in Kiev.

17. **G. longiscapa** Grossh. sp. nova in Addenda III, 735.

Perennial; bulb large, ovoid, covered with brown or grayish-brown membranous tunics; stem 15–25 cm long, slender, delicate, buried deep in the soil; radical leaf flat, 3–4 mm broad, exceeding the inflorescence, gradually attenuate toward apex, cucullate, sometimes glaucescent; floral leaves opposite, very unequal; the larger shorter than inflorescence, narrowly linear-lanceolate, to 3–4 mm broad, the smaller linear; inflorescence one-eighth to one-fifth as long as the stem, 3–7-flowered; pedicels unequal, slender, much longer than flower, erect in fruit;
80 perianth segments narrowly linear, 10–12 mm long, obtusish to subacute, yellow within, greenish outside; stamens one-third shorter than perianth; anthers ovoid-globose; capsule obovoid, half the length of perianth. April-May.

Wet meadows and scrub. — W. Siberia: Irt.; E. Siberia: Ang.-Say.; Far East: Uss. Endemic.

Note. A species needing further study.

18. **G. Helenae** Grossh. in Schedae ad Herb. Pl. orient. exs. Fasc. I, VIII (1924) 21. — G. erubescens Miscz. (non Besser) in Fl. Cauc. crit. II, 4 (1912) 150, p. p., quoad pl. cauc. — Ic.: Fl. Tiflisa I (1925) 99. — Exs.: l. c., No. 78.

Perennial; bulb small, 5–8 cm long, ovoid, clothed in dark tawny tunics; stem 10–15 cm long, weak; base of stem and of radical leaf red; radical leaf rounded dorsally, ecarinate, slightly canaliculate above, 2–4 mm broad, exceeding the inflorescence; floral leaves opposite, the lower lanceolate, enlarged toward base, equaling the inflorescence, cucullate; inflorescence 3–7 (9)-flowered; pedicels long, unequal; perianth slightly open; segments 10–12 mm long, pale yellow within, green outside, enlarged at the middle, narrowed toward base and toward apex, obtusish; capsule ovoid, about half the length of perianth; fruiting pedicels obliquely ascending. April-May. (Plate VI, Figure 12 a, b).

Scrub and borders of woods in the middle mountain zone. — Caucasus: Cisc., E. Transc. Endemic. Described from Georgia. Type in Tiflis.

Cycle **Pusillae** Terr. Bol. Soc. Aragon. Sienc. nat. IV (1905) 220. — Radical leaf narrowly linear, distinctly carinate beneath, more or less canaliculate above; capsule obovoid, narrowed toward base.

19. **F. pusilla** (Schmidt) Roem. et Schult. Syst. Veget. VII (1829) 543; Ldb. Fl. Riss. IV, 138; Shmal'g. Fl. II, 503; Miscz., Fl. Cauc. cr. II, 4 (1912) 153, p.p. — Ornithogalum pusillum Schmidt, Fl. Bohemica (1793) 339. — G. podolica Schult. Syst. veget. VII (1829) 545; Ldb. Fl. Ross. IV, 139. — Ic.: Rchb. Ic. Fl. Germ. t. 1044. — Exs.: Fl. exs. Austro-Hungar. No. 3487; HFR No. 1637.

Perennial; bulb medium size, ovoid, covered with light brown tunics; sometimes the bulb oblique and furnished with a small subsidiary bulblet (var. obliqua Kerner); stem 7–8 cm long, delicate, rarely up to 10–17 cm long with numerous flowers (var. luxurians Terr. - f. hortensis Alech.); plants green throughout, not pruinose; radical leaf narrowly linear, 1.5–2 (3) mm broad, carinate beneath, canaliculate above, exceeding the inflorescence; floral leaves opposite, glabrous, rarely floral leaves and pedicels densely ciliate-hairy (f. villosa Terr.), the lower narrowly lanceolate, exceeding the inflorescence; inflorescence 1–4-flowered; pedicels half as long again to twice as long as the flower; fruiting pedicels erect or obliquely ascending and becoming elongated; commonly one flower opening in inflorescence; perianth segments 10–12 mm long, narrowly linear-oblong, gradually attenuate toward apex and slightly
81 acuminate, pale yellow within, green outside; capsule ovoid-globose, about half the length of perianth. February-April.

Steppes, dry grassy slopes, steppe scrub, margins of woods, and fields. — European part: U. Dnp., M. Dnp., V.-Don, Transv., Bl., L. Don, L. V.; Caucasus: Cisc. (rare); W. Siberia: U. Tob.; Centr. Asia: Ar.-Casp. **Gen. distr.**: Centr. Eur., Bal.-As. Min. (?). Described from Austro-Hungary. Type in Prague (?).

20. **G. Fedtschenkoana** Pascher in Fedde, Repert, sp. nov. I (1906) 190. — G. pusilla ssp. asiatica B. Schischk. et Sumn. var. fragrans, var. parviflora et var. incurva B. Schischk. et Sumn. in Animadv. System. ex Herb. Tomsk. No. 8 (1928); Kryl., Fl. Zap. Sib., III (1929) 598.

Perennial; bulb relatively large, 8–15 (18) mm long, ovoid to ovoid-globose, covered with grayish-brown or tawny-brown tunics; stems slender, 3–10 cm long; radical leaf commonly greatly exceeding or rarely about as long as inflorescence, narrowly linear, slightly canaliculate above, faintly carinate beneath, 1–3 (rarely to 5) mm broad; floral leaves opposite or nearly so, the lower linear-lanceolate, more or less ciliate-margined, shorter to slightly longer than inflorescence; inflorescence commonly umbelliform, 1–5-flowered; pedicels smooth, shorter than to as long as or rarely half as long again to twice the length of flower; perianth segments 6–9 mm (v. parviflora Schischk. et Sumn.) to 15–16 mm long, golden-yellow or whitish-yellow within, reddish-buff to blackish-tawny or rarely greenish outside, sometimes vanilla-scented (v. fragrans Schischk. et Sumn.), narrowly linear-oblong, $1\frac{1}{2}$–(3) mm broad; stamens one-third to one-half shorter than perianth. April-May. (Plate VI, Figure 14).

Steppes, wastelands, stony slopes, and margins of pine woods.— W. Siberia: Ob (only in S.), Irt., Alt.; Centr. Asia: Balkh. Endemic. Described from the Irtysh River. Type in Leningrad.

21. **G. Capusii** Terr. in Bull. Herb. Boiss. V (1905) 1115.— G. turkestanica Pascher in Bull. Soc. Nat. Mosc. XIX (1907) 365.

Perennial; bulb relatively large, rounded-ovoid, covered with light grayish-brown tunics; in nonflowering specimens a long slender obliquely descending stalk bearing a small glabrous whitish bulblet; stem 10–15 (20) cm long, glabrous; radical leaf solitary, arched, about twice the length of inflorescence, narrowly linear, 2–4 mm broad, very distinctly carinate beneath, canaliculate above; floral leaves opposite, the lower lanceolate, exceeding the inflorescence, prominently 3-nerved, the upper much shorter; floral leaves and pedicels villous-ciliate; inflorescence 3–8-flowered; pedicels unequal, $1\frac{1}{2}$–2 (3) times the length of perianth; fruiting pedicels often declined; perianth segments 12–15 mm
82 long, oblong-linear, obtusish, yellow within, green outside; capsule oblong-obconical, about half the length of perianth. March-April. (Plate VII, Figure 1 a, b).

Dry clayey slopes, in plains and foothills.— Centr. Asia: Balkh., Syr D., Pam.-Al., T. Sh. Endemic. Described from Soviet Central Asia. Type in Paris.

22. **G. parva** Vved. in schedis (1932).

Perennial; bulb very small, ovoid, covered with coriaceous light brown tunics; bulb of nonflowering specimens without offshoots and bulblets; plants cinerescent-green throughout, 3–10 cm tall; radical leaf solitary, arched, half as long again as the inflorescence, narrowly linear, 1.5–2.5 mm broad, canaliculate above, carinate beneath; floral leaves 2, opposite, the lower equaling or shorter than inflorescence, narrowly lance-linear; inflorescence 2–6-flowered; pedicels unequal, puberulous; fruiting pedicels recurved and subarcuate; perianth segments 9–10 mm long, linear, obtusish, yellow within, green outside; capsule obovoid, two-thirds the length of perianth segments. March.

Plains and on dry clayey foothill slopes.— Centr. Asia: Syr D. Endemic. Described from Tashkent. Type in Tashkent.

23. G. Chanae Grossh. in Schedae ad Herb. "Pl. orient. exs". Fasc. I-VIII (1924) 16. — G. pusilla Miscz. in Fl. Cauc. crit. II, 4 (1912) 153 pp. — Ic.: Fl. Tiflisa, 100 (1925) 42. — Exs.: l.c. No. 55.

Perennial; bulb medium size, rounded-ovoid, covered with dark tawny tunics; stem 5-15 cm long; plants pruinose throughout; radical leaf solitary, narrowly linear, 2-3 (4) mm broad, canaliculate above, carinate beneath, not cucullate, commonly one-third as long again as inflorescence; floral leaves opposite, the lower equaling or exceeding the inflorescence, lanceolate, in lower part to 5 mm broad; floral leaves and pedicels commonly villous-ciliate with spreading hairs; inflorescence 2-3 (5)-flowered; pedicels unequal; perianth segments 8-12 (15) mm long, linear-oblong, nearly same breadth throughout, slightly attenuate toward apex, obtusish, pale yellow within, greenish outside; capsule ovoid-globose, one-third shorter than perianth segments. March-April.

Grassy slopes, scrub, and cultivated fields in lower and middle mountain zone. — Caucasus: Cisc., E. and S. Transc. Endemic. Described from central Georgia. Type in Tiflis.

24. G. Germainae Grossh. in Schedae ad herb. "Pl. or. exs." Fasc. I-VIII (1924) 10. — G. erubescens Miscz., Fl. Cauc. crit. II, 4 (1912) 150 ex parte. — G. pusilla auct. Taur. et Cauc. — Ic.: Fl. Tiflisa I, 101 (1925) 43. — Exs.: l.c. No. 30.

Perennial; bulb 8-10 mm long, ovoid, with dark tawny tunics; stem
83 4-15 cm long; plants green, lustrous throughout; radical leaf narrowly linear, 2-5 mm broad, about twice the length of inflorescence, canaliculate above, carinate beneath, cucullate; floral leaves opposite, the lower lanceolate, in lower part to 10 mm broad, cucullate, commonly exceeding the inflorescence; base of floral leaves and pedicels more or less ciliate; inflorescence 2-7-flowered; pedicels unequal; perianth segments 14-15 (to 18) mm long, more or less enlarged in upper one-third, triangular-tipped, obtusish, bright yellow sometimes tinged with orange within, green outside; stamens one-third shorter than perianth; capsule rounded-obovoid, less than half the length of perianth. April. (Plate VII, Figure 2 a).

Cultivated field, grassy slopes, and wood margins, from the lower to the middle and subalpine zones. — European part: Crim.; Caucasus: Cisc., E. and S. Transc. Gen. distr.: Iran. Described from central Georgia. Type in Tiflis.

Cycle **Triquetrae** Grossh. — Radical leaf hollow, sharply triquetrous.

25. G. triquetra Vved. in Opred. rast. okrest. Tashkenta (1923) 59.

Perennial; bulb ovoid-globose, covered with light brown coriaceous tunics; in nonflowering and sometimes in flowering specimens one or two adventitious oblong whitish nontunicated bulblets borne on a rather long underground offshoot; stem 15-20 cm long; radical leaves solitary, greatly exceeding the inflorescence, to 30 cm long, 3-4 broad mm, triquetrous, hollow, canaliculate; floral leaves opposite, minutely crisp-haired, the lower broadly lanceolate, amplexicaul, canaliculate, exceeding the inflorescence, prominently 3-nerved beneath, nearly tricarinate;

inflorescence 3–7-flowered; pedicels unequal, crisp-haired, equaling or slightly longer than perianth, declined after anthesis; perianth segments 15–18 mm long, linear-lanceolate, acutish, yellow within, green outside; capsule obovoid-oblong, half the length of perianth. March. (Plate VII, Figure 3 a).

Dry clayey slopes. — Centr. Asia: Syr D. Endemic. Described from Tashkent. Type in Tashkent.

Series Dibulbosae Terr., Bull. Soc. Bot. de France, 52 (1905) 12. — Bulbs 2 in common sheath, rarely 1 by reduction of the smaller bulb; radical leaves 2, rarely 1; stem arising between the bulbs.

Subseries **Fistulosae** Terr. Bolet. Soc. Aragonens. Cienc. natur. IV (1905) 223. — Radical leaves 1 or 2, fistulous; second bulb small, at the base of the primary bulb.

Cycle 1. **Eufistulosae** Terr. Bull. de l'herb. Boiss. V (1905) 1117. — Perianth segments bright yellow, lance-elliptic, obtuse or subobtuse.

26. **G. fistulosa** (Ram.) Ker-Gawl. in Journ. Roy. Inst. I (1816) 180; Miscz., Fl. cauc. cauc. cr. II, 4 (1912) 155 p.p. — Ornithogalum
84 fistulosum Ram. in Lam. et DC., Fl. Fr. III (1805) 215. — G. Liottardi Ldb. Fl. Ross. IV, 140 p.p.; Boiss. Fl. Or. V, 204 p.p.; Shmal'g., Fl. II, 502. — Ic.: Redouté. Liliacée, t. 28; Rchb., Ic. Fl. Germ. t. 1041 and 1042. — Exs.: Fl. Exs. Austro-Hung. No. 3493 (1902).

Perennial; bulb globose to ovoid; secondary bulb small, smooth; tunics white, rarely dark tawny; stem 10–15 (18) cm long; radical leaf fistulous, semicylindric, glabrous, exceeding the inflorescence; floral leaves subopposite, the lower equaling the inflorescence, enlarged at base, abruptly attenuate and tapering toward apex; inflorescence 3–5-flowered; pedicels unequal, more or less hairy; perianth segments 15–20 mm long, elliptic to elliptic-lanceolate, obtuse to subobtuse, yellow within, green or reddish outside; stamens shorter than perianth; capsule substipitate, triquetrous, emarginate, about half the length of perianth. April-June.

Meadows, wood margins and grassy slopes, in the south in mountains. — European part: Crim. **Gen. distr.**: Centr. Eur., Med. (mountains). Described from France. Type in Paris (?).

27. **G. samojedorum** Grossh. sp. nova. in Addenda III, p. 736.

Perennial; bulb ovoid, second bulb very small; tunics dark gray, without a tawny tinge, numerous, mostly strongly separated into fibers; stem 8–12 cm long, slender, fistulous; radical leaf solitary, fistulous, exceeding the inflorescence, 1.5–2 mm in diameter, attenuate toward the top; lower floral leaf shorter than inflorescence, lanceolate, enlarged toward base, ca. 7–8 mm broad in lower part; second floral leaf much smaller, linear; inflorescence 1- or 2- (3)-flowered; pedicels unequal, glabrous; perianth segments 14–15 mm long, elliptic-oblong, obtuse, slightly attenuate toward apex, yellow, scarcely green-tinged outside; stamens half the length of perianth; anthers rounded-ovaloid. June-July. (Plate VII, Figure 7 a).

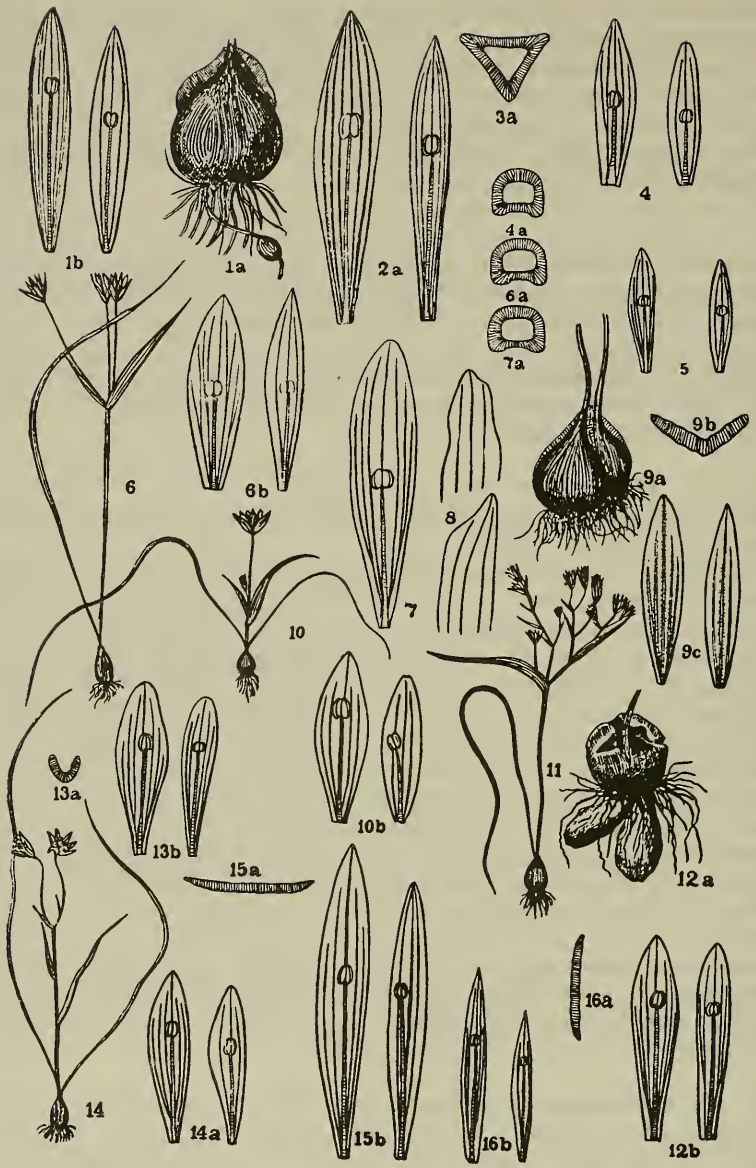

Plate VII

1. Gagea Capusii Terr.: a) bulb of a nonflowering plant; b) perianth segments.— 2. G. Germainae Grossh.: perianth segments.— 3. G. triquetra Vved.: cross section of radical leaf.— 4. G. anisanthos C. Koch.: perianth segments; a) cross segment of radical leaf.— 5. G. glacialis C. Koch.: perianth segments.— 6. G. mirabilis Grossh.: a) cross section of radical leaf; b) perianth segments.— 7. G. samojedorum Grossh.: outer perianth segment; a) cross section of radical leaf.— 8. G. emarginata Kar. et Kir.: upper part of outer perianth segments.— 9. G. dubia Terr.: a) bulb; b) cross section of radical leaf; c) perianth segments.— 10. G. tenuissima Miscz.: a) perianth segments.— 11. G. Popovi Vved.— 12. G. Paczoskii (Zap.) Grossh.: a) bulbs; b) perianth segments.— 13. G. Szovitsii (Lang) Bess.: a) cross section of radial leaf; b) perianth segments.— 14. G. Heldreichii. Terr.: a) perianth segments.— 15. G. rigida Boiss. et Sprun.: a) cross section of radical leaf; b) perianth segments.— 16. G. graminifolia Vved.: a) cross section of radial leaf; b) perianth segments.

87 Calcareous rocks and subalpine meadows. — Arctic: Arc. Eur.; European part: Dv.-Pech. Described from Pechora area (Mount Sablya). Type in Leningrad.

28. **G. anisanthos** C. Koch. in Linnaea, XXII (1849) 230; Ldb. Fl. Ross. IV, 140; Miscz., Fl. Cauc. crit. II, 1 (1912) 156. — G. Liottardi Boiss. Fl. Or. V (1889) 204 p.p. — G. fistulosa Miscz. in Fl. Cauc. crit. II, 4 (1912) 154 p.p.

Perennial; bulb ovoid, medium size; second bulb small; tunics commonly light brown, rarely dark brown; stem 8–15 cm long; radical leaf commonly solitary (rarely two radical leaves), mostly slightly exceeding the inflorescence, narrowly linear, 2.5–3 mm in diameter, hollow, semicylindric; floral leaves subopposite, the lower lanceolate, enlarged toward base, equaling or shorter than inflorescence; upper leaves abbreviated, shorter than inflorescence; inflorescence 2–8-flowered; pedicels unequal, glabrous or villous-ciliate; perianth segments 15–16 mm long, lance-elliptic to sublanceolate, markedly attenuate toward apex, sometimes subacute; stamens one-third shorter than perianth; capsule slightly concave at the top. May-July. (Plate VII, Figure 4a).

Mountain meadows from 1000 to 3000 m. — Caucasus: Greater Caucasus, Dag., E. and S. Transc. **Gen. distr.**: Arm.-Kurd., Iran. Described from Somkhetii. Type in Berlin.

29. **G. glacialis** C. Koch. in Linnaea XXII (1849) 228; Miscz., Fl. Cauc. cr. II, 4 (1918) 158. — G. foliosa Boiss. Fl. Or. V, 204, p.p. quoad pl. talysch.

Perennial; bulb medium size, ovoid-globose; second bulb very small, sometimes blackish; tunics light brown, rarely blackish-brown; stem 5–10 cm long; radical leaf solitary, rarely 2 radical leaves, 1.5–2 mm in diameter, narrowly linear, slightly exceeding the inflorescence, hollow, semicylindric; floral leaves 2, rarely 3, shorter than inflorescence, the lower lanceolate; flower solitary, rarely 2–4; pedicels unequal, slightly hairy or glabrate; perianth segments (6) 10 mm long, lanceolate, obtusish, rarely denticulate at apex, yellow within, greenish or reddish outside; stamens one-third to one-half shorter than perianth; capsule ovoid-oblong. May-August. (Plate VII, Figure 5).

Near melting snow, in high-mountain meadows, from 1000 to 3000 m. — Caucasus: Greater Caucasus, Dag., W., E. and S. Transc., Tal. **Gen. distr.**: Bal.-As. Min. (Lazistan), Arm.-Kurd., Iran (?). Described from Pontic Range. Type in Berlin.

30. **G. sulfurea** Miscz. in Acta Horti Jurjew, IX (1908) 67; Miscz, Fl. Cauc. cr. II, 4 (1912) 160. — Ic.: Acta.h. Jur. IX, Figure 1 and 1a.

Perennial; bulb medium size, ovoid, the second bulb small; tunics light brown; stem 8–15 cm long; radical leaf commonly solitary, about
88 twice the length of inflorescence, narrowly linear, hollow, semicylindric; floral leaves subopposite, unequal, the lower longer, broad; inflorescence 1–4-flowered; pedicels unequal, densely white-tomentose; perianth segments ca. 10 mm long, grayish-yellow, oblong-lanceolate, obtusish; stamens half the length of perianth; capsule ovoid-oblong. May-June.

Near melting snow and in high-mountain meadows, at 2000-3000 m. — Caucasus: Greater Caucasus. Endemic. Described from Caucasus Range. Type in Leningrad.

31. **G. emarginata** Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 851. — G. fistulosa acut. Turkest., non Ker.-Gawl. — G. variabilis M. Popov in schedis.

Perennial; bulb fairly large, ovoid; second bulb small, smooth; tunics light brown, membranous; stem 6–15 cm long; radical leaf mostly solitary (rarely 2), hollow, subcylindric, 2–4 (5) mm in diameter, equaling or slightly exceeding the inflorescence; floral leaves 2, subopposite, the lower lanceolate, commonly shorter than inflorescence; upper leaves minute, bractlike; inflorescence 2–4 (6)-flowered; pedicels unequal, more or less hairy, rarely glabrate; perianth segments 15–18 mm long, lance-elliptic, broadest at the middle, narrowed at both ends, acutish to obtusish or obliquely truncate or emarginate, yellow within, greenish outside; stamens half the length of perianth; capsule obovoid-oblong, but slightly shorter than the perianth. May-July. (Plate VII, Figure 8).

Mountain meadows, up to 3000 m. — W. Siberia: Irt., Centr. Asia: Balkh., Dzu.-Tarb., Pam.-Al., T. Sh. Endemic, probably occurring in Dzu.-Kash. Described from Akchavly mountains near Karakol River. Type in Leningrad.

32. **G. mirabilis** Grossh. sp. nova in Addenda III, p. 736. — G. Liottardi Proskuryakov in Fl. Yugo-Vost. III (1929) 345 (?).

Perennial; bulb ovoid, the second bulb small; in sterile plants a bundle of small bulblets produced in addition to primary bulb; tunics tawny-brown, coriaceous, not separating into fibers; stem 8–15 cm long, hollow, stout, to 4 mm in diameter below the inflorescence; radical leaf solitary, fistulous, 2–4 (5) mm in diameter, slightly exceeding the inflorescence, linear, thickened toward apex; lower floral leaf lanceolate, broad and subamplexicaul at base, 10–12 mm broad in lower part; second floral leaf linear-lanceolate, shorter than the first; inflorescence umbelliform, 2–6-flowered; pedicels subequal, thick, 3–4 times the length of flower; perianth segments 10–12 mm long, lance-oblong, attenuate upward, subacuminate, pale yellow within, greenish outside; stamens half the length
89 of perianth; anthers oblong; capsule one-half to two-thirds the length of perianth, obovate, slightly emarginate. April. (Plate VII, Figure 6a, b).

Wet meadows, sinkholes, and steppes. — European part: Transv. (?); W. Siberia: Irt.; Centr. Asia: Ar.-Casp. Endemic. Described from Kazakhstan. Type in Leningrad.

Note. Specimens collected by Ovchinnikov in Ufa District represent fragments of a single plant and their precise identification is impracticable. The fistulous Gagea from Ufa may possibly belong to G. samojedorum and not to this species.

Subsection ARVENSES Terr., Bolet. Socied. Aragon. Cienc. natur. IV (1905) 226. — Radical leaves 2, very rarely solitary, not fistulous; bulblets often produced in the axils of floral leaves.

Cycle **Micranthae** Terr. in Bull. de l'herb. Boiss. V (1905) 1124. — The larger bulb smooth, the smaller reticulate-foveolate; radical leaves flat, nervose, subcylindric merely at apex; perianth segments lanceolate, acutish.

33. **G. tenuissima** Miscz. in Fl. Cauc.-crit. II, 4 (1912) 163. — Exs.: Pl. or. exs. No. 202 (1928).

Perennial; bulbs 2, small, subequal; tunics thin, dark brown; stems slender, 3–10 (15) cm long, glabrous; radical leaves 2, two to four times the length of inflorescence, filiform, very slender; floral leaves 2, narrowly linear, tapering-filiform, the lower enlarged at base; inflorescence 1–7-flowered; pedicels very unequal, becoming subequal after anthesis; mostly only one flower opening, raised high above the rest; perianth segments 7–10 mm long, lanceolate, obtuse, pale yellow within, greenish outside; stamens slightly shorter than perianth; stamens oblong; capsule oblong-ovoid, triquetrous, emarginate, strongly narrowed toward base. January-February. (Plate VII, Figure 10b).

Stony slopes in the middle mountain zone. — Growing in [former] Artvin District in Turkey. May occur in S. Transc. Described from Artvin District. Type in Leningrad.

Cycle **Euarvenses** Terr. Bull. de l'herb. Boiss. V (1905) 1125. — The larger bulb smooth, the smaller nearly smooth or slightly reticulate, both enveloped in root fibers; radical leaves carinate, narrow, canaliculate; bulblets, if present, smooth, very rarely reticulate.

34. **G. arvensis** Dumortier, Fl. Belg. (1827) 140; Boiss. Fl. Or. V, 205; Miscz. Fl. Cauc. cr. II, 4 (1912) 160, p. p.; Shmal'g., Fl. II, 503. — Ic.: Rchb., Ic. Fl. Germ. t. 1050 et 1051. — Exs,: Flora Galliae et Germ. exs., 2-e Cent. No. 64.

Perennial; bulbs 2, one large, the other much smaller, reticulate or foveolate; tunics brownish-gray, membranous, more or less enveloped in
90 root fibers; stem 8–20 cm long; stem and pedicels rather densely hairy; radical leaves 2, narrowly linear, ca. 2 mm broad, exceeding the inflorescence, canaliculate above, carinate beneath; floral leaves 2, unequal, subopposite, lance-linear, 6–8 mm broad at base; upper leaves abbreviated, linear-subulate, 2–4 mm broad; inflorescence 3–12-flowered; pedicels unequal, much longer than flower; perianth segments lanceolate, tapering toward apex, often with reflexed tips, golden-yellow within, green or greenish-red outside, 13–15 mm long, more or less pubescent on the black, not bearded at apex; stamens one-third shorter than perianth; anthers globose-ovoid; capsule obovoid-oblong, tapering at base, slightly shorter than perianth. April.

Dry exposed places; also as weed in fields. — European part: Bl., Crim., L. Don; Caucasus: Cisc. Gen. distr.: Centr. and Atl. Eur. (rare), Med., Bal.-As. Min. Described from Belgium.

35. **G. dubia** Terr. in Bull. Soc. Palermo II (1904) 34; Miscz. Fl. Cauc. cr. II, 4 (1912) 162. — G. Boissieri Pascher in Lotos. N.F., XXIV (1904) 121. — G. pubescens M. Popov in schedis. — G. turcomanica M. Popov in Fl. Turkm., I, 2 (1932) 269.

Perennial; bulbs 2, one much larger, the other small, irregularly reticulate; tunics tawny-brown, membranous; stem 8–17 cm; stem and pedicels more or less hairy; radical leaves 2, greatly exceeding the inflorescence, narrowly linear, ca. 2 mm broad, canaliculate above,

carinate beneath; floral leaves 2, lance-linear, subopposite, to 8–9 mm broad, sometimes with bulblets at base (f. prolifera Terr.); upper leaves numerous, small, linear-subulate; inflorescence irregularly branched, 3–10 (19)-flowered; pedicels long, unequal; perianth segments 12–13 mm long, oblong-lanceolate, obtuse to round-tipped, not reflexed, golden-yellow within, green and puberulent outside, commonly bearded at apex; capsule slightly shorter than perianth, strongly tapering toward base. April. (Plate VII, Figure 9 a–e).

Dry slopes and as weed in fields. — European part: Crim., L. Don; Caucasus: Cisc., E. and S. Transc. **Gen. distr.**: E. Med., Bal.-As. Min., Iran. Described from Asia Minor. Type in Geneva.

Cycle **Granatellinae** Terr., Bull. l'Herb. Boiss. VI (1906) 105. — The larger bulb smooth, the smaller reticulate-foveolate, enveloped in coarse root fibers; bulblets, if present, distinctly reticulate-foveolate,

36. **G. Granatelli*** Parl., Fl. Palerm. I (1845) 376; Miscz., Fl. Cauc. cr. II, 4 (1912) 163. — Ornithogalum Granatelli Parl. in Diario
91 l'Occhio, II (1939) 85. — Ic.: Parl. in Diario l'Occhio, l.c.; Rchb. Ic. Fl. Germ., f. 1050 sub G. arvensi.*

Perennial; bulb fairly large, spherical, the second bulb small, foveolate; tunics brown, enveloped in root fibers; stem 3–5 (8) cm; stem, lower part of leaves, pedicels and the outer face of perianth segments densely covered with short white hairs; inflorescence beginning from soil surface; radical leaves 2, flat, lanceolate, to 7 mm broad, strongly attenuate toward apex, equaling or exceeding the inflorescence; floral leaves 2, unequal, lanceolate, enlarged and bearing bulblets at base (v. bulbillifera Terr.), as long as to longer than flower; inflorescence 3–10-flowered; pedicels very unequal; perianth segments ovate-lanceolate, obtusish to subacuminate; 12–13 mm long; stamens one-third shorter than perianth; anthers ovoid-oblong; capsule obovoid-oblong, triquetrous. February-March.

Dry slopes. — European part: Crimea. **Gen. distr.**: Med., Bal.-As. Min. Described from Sicily. Type in Palermo or Florence (?).

Series **Tribulosae** Terr., Bolet. Soc. Aragon. Cienc. Natur. IV (1905) 231. — Bulbs 3, in separate sheaths, erect or horizontal, two of the current year and one of the preceding year; radical leaf solitary.

Cycle **Pratenses** Terr., Bull. l'Herb. Boiss. VI (1606) 109. — With characteristics of the series.

(37). **G. pratensis** (Pers.). Roem. et Schult. Syst. veget. VII (1829) 536 p.p. — Ornithogalum pratense Pers. in Ust. Ann. Bot. XI (1798) 8. — G. stenopetala Rchb. Fl. Germ. Exsc. (1833) 107; Ldb. Fl. Ross. IV (1853) 137 p.p. — Ic.: Hegi. Ill. Fl. II, 211. — Exs.: Fl. exs. Austro-Hung. No. 3485.

* Named for F.M. Granatelli, an expert on the flora of Sicily, who lived in Palermo about the middle of the 19th century.

Perennial; bulbs 3, in separate gray tunics, oblong, one larger and two smaller; stems 10–15 (20) cm long; radical leaf 1, linear, 2–5 mm broad, flat; floral leaves 2, the larger of the two shorter or rarely longer than inflorescence, linear-lanceolate; inflorescence 2–6-flowered; pedicels slender, mostly twice the length of flower or longer; perianth segments lance-oblong, acutish to subobtuse, 15–18 mm long; stamens half the length of perianth segments. March-April.

Meadows, scrub and wood margins. — Found in Poland, not far from the USSR border; likely to occur in the western part of the Soviet Union. — **Gen. distr.**: Scand., Centr. Eur. Described from Europe. Type in London (?).

38. **G. Paczoskii** (Zap.) Grossh. comb. nova. — G. pratensis var. Paczoskii Zapal., Consp. Fl. Galic. crit. I (1906) 170. — G. pratensis Schmalh. Fl. II, 502, p.p. (non Schult.). — G. stenopetala β pratensis Ldb. Fl. Ross. IV (1853) 137. — Exs.: HFR No. 489, sub G. pratensi.

92 Perennial; bulbs 3, oblong, in separate gray tunics, one larger and two smaller; stem 15 cm long; radical leaf 1, narrowly linear, 1–1.5 mm broad, flat; floral leaves 2, flat, ca. 3 mm broad, the lower exceeding the inflorescence; inflorescence 2–4 (1–5)-flowered; pedicels slender, as long as to twice the length of flower; perianth segments linear-oblong, obtusish, often cucullate, yellow within, greenish outside, 10–13 mm long; stamens one-third shorter than perianth; anthers globose; capsule subglobose. March-April. (Plate VII, Figure 12 a, b).

Meadows, scrub and wood margins. — European part: Lad.-Ilm., U. Dnp., M. Dnp., Bl. **Gen. distr.**: Centr. Eur. Described from Galicia.

39. **G. transversalis** Stev. in Bull. Soc. Nat. Mosc. XXX, 3 (1857) 81; Miscz., Fl. Cauc. crit. II, 4 (1912) 1.65. — G. pratensis Shmal'g. Fl. II (1897) 502, non Schult. — G. Gussonei Miscz. l.c. (1912) 165. — Ornithogalum transversalis Pall., Ind. Taur. (1797) 4–9.

Perennial; bulbs 3, in separate gray tunics, horizontally spreading, one larger, the two others smaller and borne on very short stalks; stem 8–15 cm long; radical leaf solitary, 1–3.5 mm broad, sharply carinate on the back, arched-recurved, exceeding the inflorescence; floral leaves 2, the lower longer, cucullate; inflorescence 1–2 (3)-flowered; pedicels unequal; perianth segments ovate-lanceolate, the outer acutish, the inner obtusish, yellow within, green outside, 10–13 (15) mm long; stamens one-third shorter than perianth; capsule ovoid. March-April.

Steppe and grassy slopes in lowlands and in mountains. — European part: Crim. **Gen. distr.**: Bal.-As. Min. (?). Described from Crimea. Type in Helsinki; cotype in Leningrad.

Section 2. **FOLIATAE** Terr., Bull. Soc. Bot. de France, 52 (1905) 19. — Stem leafy throughout; inflorescence racemose; bulbs 2, the smaller lateral, always reticulate or foveolate.

Series **Saxatiles** Terr. Bull. de l'Herb. Boiss. VI (1906) 112. — Radical leaves filiform, canaliculate; cauline leaves lanceolate, acuminate; outer perianth segments oblong-spatulate, very obtuse, the inner broader, spatulate; small plants with hairy pedicels.

40. G. **Szovitsii** (Lang.) Besser in Schult., Syst. veget. VII (1830) 550. — Ornithogalum Szovitsii Lang. Cent. Herb. Fl. Ruth. I, No. 61. — G. bohemica Ldb. Fl. Ross. IV (1853) 141; Shmal'g., Fl. II, 503, non Schult. — Ic.: Rchb. Ic. L. Germ. (1848) f. 1055. — Exs.: HFR No. 294 sub G. bohemica.

Perennial; bulb small, the second bulb very small; tunics brown; stem 3–10 cm long; radical leaves 2, slenderly filiform-linear, slightly
93 exceeding the inflorescence, cucullate; cauline leaves 2–4 distant, alternate, narrowly lanceolate, more or less enlarged toward base; flowers 2–4; pedicels fairly short, tomentulose; perianth segments 12–13 mm long, oblong-lanceolate, very obtuse and slightly enlarged toward apex, bright yellow within, greenish outside; stamens about half the length of perianth; capsule ovoid, convex at the top. February-March-April. (Plate VII, Figure 13 a, b).

Rocky and gravelly places and dry grassy slopes. — European part: M. Dnp., Bl. **Gen. distr.**: Bal.-As. Min. (Balkan Peninsula). Described from the vicinity of Odessa. Type in Geneva.

41. G. **Callieri** Pascher, Engler's Jahrb. 39 (1907) 306. — G. Szovitsii var. Callieri Miscz. Fl. Cauc. crit. II (1912) 166. — G. bohemica Shmal'g., Fl. II (1897) 503, p.p., quoad pl. ex Tauria.

Perennial; bulb medium size, the second bulb very small; sheaths grayish-brown; stem 3–7 cm long; radical leaves 2, filiform, canaliculate, about twice the length of flower; cauline leaves few, short, enlarged at base; flowers solitary or in inflorescence of 2, on unequal tomentose pedicels; perianth segments 10–12 mm long, intensely yellow, oblong-spatulate, obtuse, pubescent only at base; stamens one-third shorter than perianth; style equaling the stamens; capsule obovoid, convex at the top. February-March.

Stony and gravelly places. — European part: Crim. Endemic. Described from Crimea.

Series **Amblyopetalae** Terr., Bull. de l'herb. Boiss. VI (1905) 116. — Radical leaves long, narrowly linear, cauline leaves lanceolate, nearly opposite or alternate, naked, above center very protracted. Flowers not too large, in cymose inflorescence, golden-yellow within, greenish and naked outside; perianth segments elliptic or oblong-elliptic, obtuse. Plant of medium size, slender with few unequal pedicels.

42. G. **Heldreichii** Terr. in Bull. l'Herb. Boiss. 2-me serie, IV (1906) 119. — G. amblyopetala Miscz. in Fl. Cauc. cr. II, 4 (1912) 168. — G. chlorantha Shmal'g., Fl. II (1897) 504, p.p. quoad. pl. ex Tauria. — Exs.: HFR No. 1343, sub G. amblyopetala.

Perennial; bulb medium size, the second bulb small, tuberculate; stem 6–15 cm long; radical leaves 2, very long, reaching twice the height of flower, narrowly linear, flat; cauline leaves few, alternate, lanceolate from a broad base, long-acuminate; inflorescence 2–5-flowered; pedicels fairly short; perianth segments elliptic-oblong, rounded-obtuse, 7–9 mm long, bright yellow within, greenish outside, 3-nerved; stamens one-third shorter than perianth segments; capsule obovoid, slightly narrowed toward base, convex at the top. March. (Plate VII, 14 a).

94 Forest glades and clearings. — European part: Crim. **Gen. distr.**: Med., Bal.-As. Min. Described from Greece. Type in Geneva (?).

Subgenus II. **PLATYSPERMUM** (Boiss.) Miscz. Fl. Cauc. crit. II, 4 (1913) 169. — Seeds flat; bulb solitary, sometimes with several small subsidiary bulblets; stigma undivided or 3-lobed.

Section 1. **EUPLATYSPERMUM** Miscz., Fl. Cauc. cr. II 4 (1913) 169. — Stigma undivided or nearly so.

Subsection 1. RETICULATAE Pascher. Bull. Soc. Nat. Moscou XIX (1905) 366. — Ovary prismatic, scarcely narrowed at base, existipitate, often slightly emarginate at the top.

Series **Eureticulatae** Pascher, Bull. Soc. Nat. Moscou XIX (1905) 366. — Cauline leaves gathered at the base of inflorescence; radical leaf solitary; perianth segments long-acuminate.

Cycle 1. **Planifoliae** Grossh. — Radical leaf flat, ecarinate, narrowly linear to lanceolate.

43. **G. rigida** Boiss. et Sprun., Diagn., ser. I, 7 (1846) 108. — G. reticulata γ fibrosa Boiss. Fl. Or. V (1884) 208.

Perennial; bulb ovoid; tunics dense, forming a short split collar and enveloped in root fibers; finely hairy cinerescent-green plants; stem 5–10 (15) cm long; radical leaf flat, ecarinate, to 5 mm broad, exceeding the inflorescence, slightly reflexed at the tip; floral leaves 3–5, narrowly linear, unequal, mostly shorter than inflorescence; lower stem internodes poorly developed, thus inflorescence starting nearly at plant base; inflorescence 1–3-flowered; pedicels fairly strong, long, straight; perianth segments 14–20 mm long, narrowly lanceolate, long-acuminate, yellow within, green and very narrowly yellow-margined on the outside, glabrous or ciliate-margined near apex; anthers oblong. April. (Plate VII, Figure 15, a, b).

Grassy clay slopes in the lower mountain zone. — Centr. Asia: Mtn. Turkm. Gen. distr.: Bal.-As. Min., Iran. Described from Argolida (Greece). Type in Geneva.

44. **G. graminifolia** Vved. in Fl. Turkm. II, 2 (1932) 268.

Perennial; bulb ovoid; tunics light gray, forming a split collar 4–5 mm long and enveloped in delicate gray root fibers; glabrous plants; stem 2–3 (5) cm long; leaves to 8–10 cm long; radical leaf solitary, light green, linear, 2–3 (4) mm broad, flat, ecarinate, at anthesis 2–3 times as long as inflorescence; floral leaves 3–5, unequal, the lowest resembling the radical leaf, several times the length of inflorescence, the others abbreviated, narrowly linear to subfiliform; flower solitary or inflorescence 2- or 3-flowered; pedicels slender; perianth segments (7) 10–12 (16) mm
95 long, unequal, finely long-acuminate, the outer 1–1.5 mm longer than the inner, pale yellow within, greenish outside; pedicels and perianth elongating

in fruit; capsule broadly obovoid, half the length of perianth segments. March-April. (Plate VII, Figure 16 a, b).

Loess and clay slopes, up to 500 m. — Centr. Asia: Kyz. K., Kara-K., Mtn. Turkm., Amu D., Pam.-Al. Endemic (probably occurring in Iran). Described from Tashkent. Type in Tashkent.

45. **G. hissarica** Lipsky in A. H. P. XXIII (1904) 241. — Ic.: Lipsky l. c., f. 4–7 (1904).

Perennial; bulb medium size, ovoid; tunics finely reticulate, brownish-gray; collar none; plants glabrous; stem 2–5 cm long, rarely up to 10 cm (var. robusta Grossh.); radical leaf bright green, flat, ecarinate, to 5–6 mm broad, flexuous and often decumbent, the flowers thus apparently arising at stem base; floral leaves up to 3, the lowest resembling the radical leaf, often overtopping the flowers, the others narrowly linear, shorter; flower often solitary or inflorescence 2-(3)-flowered; pedicels slender, glabrous; perianth segments 10–12 (15) mm long, elliptic-lanceolate, 2–3 mm broad, short-acuminate, bright yellow within, green outside, sometimes reddish-tinged and very narrowly yellow-margined; anthers oblong; stamens one-third shorter than perianth. April, May, June. (Plate VIII, Figure 7).

Alpine zone, near snow, or fine-textured grassy slopes. — Centr. Asia: Pam.-Al., T. Sh. (3000–3600 m). Endemic. Described from Gissar Range. Type in Leningrad.

Cycle 2. **Tenuifoliae** A. Grossh. — Radical leaf carinate, canaliculate above, more or less 5-angled.

46. **G. divaricata** Rgl. in A. H. P. IV (1879) 510.

Perennial; bulb ovoid; tunics membranous, gray; collar none; stem glabrous, 8–15 cm long; radical leaf solitary, narrowly linear, ca. 1–1.5 mm broad, reflexed at the tip, overtopping the inflorescence; floral leaves 2 or 3, unequal, narrowly linear, shorter than inflorescence; inflorescence 1–5 (7)-flowered; pedicels fairly strong, unequal, erect in flower, arched-recurved in fruit; perianth segments ca. 10 mm long, finely pointed, pale yellow within, the outer face with a broad green median band and a narrow yellowish-white margin, the segments accrescent and becoming indurated in fruit, reaching twice the length of capsule; capsule broadly obovoid, obscurely 6-angled. March-April. (Plate VIII, Figure 8).

Sandy places. — Centr. Asia: Balkh., Dzu.-Tarb., Kyz. K., Kara K., Amu D. Endemic. Described from Alma Ata area. Type in Leningrad.

47. **G. Bergii** Litv., Rast. ber. Aral'skogo m. i Syr-Dar. obl., sobr. L. S. Bergom (1905) 33. — Ic.: Ibid. 33.

96 Perennial; bulb solitary, ovoid; tunics membranous, forming a slender collar ca. 10–16 mm long; stem firm, 5–15 cm long; radical leaf solitary, reflexed at the tip, linear-filiform; floral leaves 3–5, unequal, filiform, the base slightly below soil surface and somewhat enlarged, dark axillary bulblets causing the leaf axil to bulge downward; flower solitary or rarely 2; pedicel firm, erect, much longer than flower; perianth segments 10–15 mm long, the outer tapering to a point, the inner less pointed, yellow within,

green and yellow margined outside, indurated and accrescent in fruit; capsule half to two-thirds the length of perianth segments, obovoid, faintly lanuginous. March-April. (Plate VIII, Figure 3).

Sandy and sandy-clay soils. — Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D. Endemic. Described from Chimkent area. Type in Leningrad.

48. G. **ucrainica** Klok. Ucr. Bot. Mag. III (1926) 16. — G. reticulata Shmal'g., Fl. II (1897) 504, p.p. quoad pl. ex Ucrainia.

Perennial; bulb medium size, ovoid, 5–7 mm long; tunics gray, produced into a very short collar (3–11 mm) and enveloped in delicate slender root fibers; stem 4–10 cm long; basal leaf narrowly linear, carinate, slightly tapering toward apex, mostly somewhat exceeding the inflorescence; floral leaves 3–7, very unequal, narrowly linear, attenuate-acuminate, enlarged at base, the lowest rarely overtopping the inflorescence; inflorescence 2–5-(8)-flowered; stem, leaves, pedicels and the outer face of perianth segments densely covered with short gray hairs; pedicels unequal, erect, fairly slender; perianth segments 10–13 mm long, oblong-lanceolate, acuminate, lemon-yellow within, green and narrowly yellow-margined outside; anthers oblong-ovoid; capsule ovoid-oblong, much shorter than perianth segments. March-April. (Plate VIII, Figure 1 a, b).

Sandy slopes. — European part: Black Sea area. Endemic. Described from S. Ukraine. Type in Kharkov.

99 49. **G. taurica** Stev. in Bull. Soc. Nat. Mosc. XXX, 3 (1857) 83; Miscz., Fl. Cauc. cr. II, 4 (1912) 172. — G. reticulata Boiss. Fl. Or., V (1884) 208 p.p.; Shmal'g., Fl. II, 504, quoad pl. ex Tauria.

Perennial; bulb rather large, ovoid; tunics gray, densely enveloped in interlaced coarse root fibers; collar none; stem 8–15 cm long; radical; leaf narrowly linear, 1.5–2 mm broad, carinate, cinerescent, greatly overtopping the inflorescence, reflexed at the tip; floral leaves 3, very unequal, the lowest often overtopping the inflorescence; floral leaves and the outside of outer perianth segments rather densely covered with short hairs; inflorescence 1–2 (3)-flowered; pedicels erect, firm; perianth segments linear-lanceolate, ca. 12–13 mm long, rather long-attenuate to a fine point, yellow within, green or grayish-green and narrowly yellow-margined outside; anthers oblong; capsule ovoid to subglobose-ovoid, one-fourth shorter than the perianth segments. March-April. (Plate VIII, Figure 5, a).

Dry grassy slopes and gravels in the lower mountain zone. — European part: Crim.; Caucasus: Cisc., E. Transc. Endemic. Described from Crimea. Type in Helsinki.

50. G. **Alexeenkoana** Miscz., Acta Horti Jurjew., IX, 2 (1908) 76; Miscz., Fl. Cauc. cr. II, 4 (1912) 173. — Ic.: Mishchenko, Acta H. Jurjew, t. 1, f. 3.

Perennial; bulb ovoid; tunics gray, finely reticulate, scarcely enveloped in root fibers, split at the top and not forming a collar; stem 5–15 cm long, erect; stem and leaves glabrous; radical leaf mostly longer than inflorescence, narrowly linear, 1–2 mm broad, canaliculate above, green to faintly glaucescent; floral leaves 2 or 3, narrowly linear, enlarged at base, commonly shorter than or rarely the lowest exceeding the

Plate VIII

1. Gagea ucrainica Klokov: inflorescence; a) bulb; b) perianth segments.— 2. G. tenuifolia (Boiss.) Fom.: bulb with collar; a) perianth segments.— 3. G. Bergii Litw.— 4. G. Alexeenkoana Miscz.: perianth segments.— 5. G. taurica Stev.: inflorescence; a) bulb.— 6. G. commutata C. Koch: bulb.— 7. G. hissarica Lipsky.— 8. G. divaricata Rgl.: fruiting.— 9. G. pseudoreticulata Vved.: a) bulb; b) cross section of radical leaf.— 10. G. reticulata (Pall.) Roem. et Schult.: cross section of radical leaf.— 11. G. bulbifera (Pall.) Roem. et Schult.: plant portion; a) perianth segments.— 12. G. altaica B. Schischk. a) perianth segments.— 13. G. chlorantha (M.B.) Roem. et Schult.: portion of plant after anthesis.— 14. G. Alberti Rgl.: a) bulb with collar; b) perianth segments.— 15. G. Chomutovae Pascher: a) cross section of radical leaf; b) perianth segments.— 16. G. minutiflora Rgl.; perianth segments.

inflorescence; inflorescence 1–3-flowered; pedicels erect, slightly hairy; perianth segments 12–15 mm long, lance-elliptic, narrowed toward base, short-acuminate at apex, yellow within, green and narrowly yellow-margined outside; capsule obovoid. April-May. (Plate VIII, Figure 4).

Grassy and gravelly slopes from the middle mountain zone to the alpine zone. — Caucasus: Greater Caucasus, Dag., E. and S. Transc. Endemic. Described from the eastern part of the Greater Caucasus. Type in Leningrad.

51. **G. Caroli-Kochii** Grossh. sp. nova. in Addenda III, p. 736, tab. XLIV, figure 4, a–c. — G. Alexeenkoana var. tenuis Grossh. Fl. Kavk. I (1928) 196.

Perennial; bulb ovoid, densely enveloped in slender fibers; tunics gray; stem 5–8 cm long, very slender, covered with short hairs; inflorescence 2–5-flowered or rarely flower solitary (v. subuniflora Grossh.); radical leaf slightly overtopping the inflorescence, linear very thin, 0.5–1 mm broad; lowest floral leaf linear-lanceolate, mostly shorter to rarely exceeding the inflorescence; other floral leaves strongly abbreviated, linear-subulate; pedicels commonly shorter than flower; perianth segments 10–11 mm long, yellow, green on the back, long-acuminate; capsule obovoid, half the length of perianth. May-June.

Meadows in the middle and subalpine mountain zones. — Caucasus: S. Transc. Endemic. Described from Ordubad District. Type in Baku.

52. **G. pseudoreticulata** Vved. in Fl. Turkm., Vol. I, No. 2 (1932) 268, nomen. — Ic.: Regel, Izv. Obshch. Estestv. Antr. i Etnogr., Vol. XXI, pt. 2, Vol. XIX, 1–3 (1876), sub. G. reticulata.

Perennial; bulb ovoid; tunics gray, fibrous, split at the top and not forming a distinct collar; young bulbs furnished with small bulblets; stem 10–30 cm long, firm; stem, leaves, and pedicels usually slightly covered with short hairs; radical leaf grayish-green, narrowly linear, ca. 1–1.5 mm broad, arched above, exceeding the inflorescence; floral leaves 3–5, unequal, linear-filiform, shorter than inflorescence; inflorescence 3–10-flowered; pedicels firm, erect, unequal, several times the length of flower; perianth 10–12 mm long; segments pale yellow within, grayish-green outside with a very narrow whitish-yellow margin, long-acuminate, accrescent to twice the length in fruit; capsule obovoid, faintly angled, about half the length of perianth segments. — March-April. (Plate VIII, Figure 9, a, b).

Argillaceous plains and foothills. — Centr. Asia: Kyz. K., Kara K., Mtn. Turkm., Amu D., Syr D., Pam.-Al. Gen. distr.: Iran. (Afghanistan). Described from Turkmenia. Type in Tashkent.

53. **G. commutata** C. Koch. in Linnaea, XXII (1849) 227. — G. sarmentosa C. Koch in Linnaea XXII (1849) 230. — G. triphylla C. Koch, Linnaea XXII (1849) 230. — R. reticulata v. commutata and v. sarmentosa Miscz., Fl. Cauc. cr. II, 4 (1912) 171. — G. reticulata Ldb. Fl. Ross. IV (1853) 143, p.p. — Ic.: Rchb. Ic. Fl. Germ. (1848) f. 1047 (mala, sub G. chlorantha). — Exs.: Herb. Fl. Cauc. No. 261, sub G. sarmentosa.

Perennial; bulb ovoid; tunics brown, more or less enveloped in root fibers, membranous and lacerate at the top, not forming a collar; bulb often giving rise to white filiform offshoots terminating in white tuberous bulges; stem (4) 10–20 cm long, rather firm; radical leaves mostly 2, somewhat overtopping the inflorescence, 1–3 mm broad, flattened 5-angled in cross section, commonly more or less glaucous; scape sometimes strongly abbreviated with pedicels arising directly from the top of the bulb; pedicels firm, many times the length of flower; flowers solitary or few; floral leaves 3–5, very unequal, narrowly linear, the lowest often exceeding the inflorescence; perianth large, 15–18 mm long; segments yellow within, green and broadly yellow-margined outside, tapering long-acuminate; anthers oblong; capsule ovoid-oblong, obtuse. April. (Plate VIII, Figure 6).

101 Dry grassy slopes, scrub, and arable land, up to the middle mountain zone. — Caucasus: Dag., E. Transc. **Gen. distr.**: Iran. Described from Transcaucasia. Type in Berlin.

54. **G. reticulata** (Pall.) Roem. et Schult., Syst. veget., VII (1829) 542; Ldb. Fl. Ross. IV, 142, p.p.; Boiss. Fl. Or. V, 208 p.p.; Shmal'g. Fl. II, 504 p.p. — Ornithogalum reticulatum Pall., Reise, III, Anhang (1776) 727. — O. circinatum L.f. Suppl. (1781) 199. — Ic.: Pall. l.c. tab. D, f. 2 (1776); Rgl., Izv. Obshch. Estest., Antr. i Etnogr., XXI, 2, Plate XIX, f. 4 (1876); Fl. Yugo-Vost. III, Figure 177.

Perennial; bulb solitary, ovoid; tunics finely reticulate-fibrillose, gray, produced into a collar, this sometimes sheathing the stem nearly up to inflorescence base; plants solitary; stem 5–15 (20) cm long, erect; radical leaf solitary, narrowly linear, 0.5–2 (2.5) mm broad, firm, glaucescent, reflexed at the top, overtopping the inflorescence; floral leaves 3–5, unequal, narrowly linear-subulate; perianth segments glabrous, tapering long-acuminate, bright yellow within, green and very narrowly yellow-margined outside, accrescent in fruit. April. (Plate VIII, Figure 10).

Dry grassy slopes; sandy and gravelly soils. — European part: L. V.; Caucasus: E. Transc.; Centr. Asia: Ar.-Casp., Kara K. Endemic. Described from Astrakhan. Type in Leningrad.

55. **G. tenuifolia** (Boiss.) Fomin in Fom. and Voron., Opred. rast. Kryma i Kavkaza, I (1909) 233. — G. reticulata var. tenuifolia Boiss. Fl. Or. V (1884) 208; Miscz., Fl. Cauc. cr. II, 4 (1912) 170. — G. reticulata Misc. l.c. (1912) 169. — Ic.: Rchb., Ic. Fl. Germ. (1848), f. 1054, sub. G. reticulata. — Exs.: Herb. Fl. Cauc. No. 352; Pl. or. exs. No. 79.;

Perennial; bulb solitary, ovoid; tunics brownish-gray finely reticulate-fibrillose, produced into a collar reaching the middle of stem or nearly up to inflorescence; plants in groups of several; radical leaf solitary, slenderly filiform, 0.5–1.5 mm broad, reflexed at apex, greatly overtopping the inflorescence; floral leaves 3–5, ciliate at base, finely subulate, the lowest mostly much longer than inflorescence; inflorescence 2–5-flowered; pedicels erect, slender but firm; perianth segments 10–11 mm long, elongating in fruit to 15–17 mm, subulately long-acuminate, bright yellow within, green and narrowly yellow-margined outside; capsule obovoid, half the length of perianth segments. April. (Plate VIII, Figure 2 a).

Scrub; gravelly and dry slopes in the lower and middle mountain zones. — Caucasus: E. and S. Transc. **Gen. distr.**: Iran. Described from vicinity

of Elenendorf and Elizavetpol', now Kirovabad. Type in Geneva in the Boissier Herbarium.

102 Series **Euchloranthae** Pascher, Bull. Soc. Nat. Moscou XIX (1907).— All cauline leaves alternate; perianth segments, obtuse or acute, sometimes not tapering-acuminate.

Cycle **Pseudolloydia** Grossh.— Basal leaf cylindric, fistulous.

56. **G. improvisa** Grossh. Sp. nova in Addenda III, p. 737, tab. XLIV, Figure 1, a–c.

Perennial; bulb ovoid, 10–15 mm long, with a lateral cluster of numerous small bulblets, these at length turning blackish and readily falling off; tunics coriaceous, light brown or grayish-brown; stem 10–25 cm long, glabrous; radical leaf solitary, greatly overtopping the inflorescence, hollow, cylindric, 5–6 mm in diameter; cauline leaves few, flat, the lowest oblong-lanceolate, the others lanceolate, much abbreviated and passing into bracts; flowers 2 or 3; pedicels slender, subnutant, 2–3 times the length of flower; flowers 10–11 mm long, wide open; perianth segments yellow, with a broad green dorsal band, oblong-elliptic, obtusish; stamens slightly shorter than perianth, with oblong anthers; ovary sessile, oblong-ellipsoid; stem stout, short. April.

Gravelly and stony calcareous slopes in the middle mountain zone.— Caucasus: S. Transc. Endemic. Described from Ordubad on the Araks River. Type in Baku.

57. **G. Chomutovae** Pascher in Bull. Soc. Nat. Mosc. XIX (1907) 372.— G. Olgae var. Chomutovae Pascher in Fedde, Repert, sp. nov. II (1906) 67.— G. rubroviridis Vved. Opred. rast. okr. Tashkenta (1924) 61 non Boiss. et Ky.— Ic.: Rgl. in Izv. Obshch. Estest., Antr. i Etnogr., XXI, pt. 2, Vol. XX, Figure 4 (sub. G. chlorantha).

Perennial; bulbs 2, one larger, the other small, smooth, within a common sheath; tunics blackish-brown, coriaceous; collar none; stem 10–40 cm long, glabrous, bearing a terminal racemose-umbellate inflorescence; radical leaf solitary (rarely 2), fistulous, shorter than inflorescence, 1.5–2.5 mm in diameter; first cauline leaf linear-lanceolate, amplexicaul; other leaves successively diminishing and passing into bracts; pedicels long, nutant before anthesis; perianth segments (7) 9–12 mm long, oblong-lanceolate, obtusish, reticulately nerved, yellow, greenish outside, often reddish-tinged, closed in fruit; stamens one-third shorter than perianth; capsule oblong-obovoid, half the length of perianth. April. (Plate VIII, Figure 15, a, b).

Clay slopes, in plains and in foothills.— Centr. Asia: Balkh., Kyz. K., Kara K., Mtn. Turkm., Amu D., Syr D., Pam.-Al., T. Sh. Gen. distr.: Iran. Described from the vicinity of Tashkent. Type in Leningrad.

103 Cycle **Chloranthae** Grossh. — Leaves not fistulous; pedicels very unequal, elongating after flowering; inflorescence cymose.

58. **G. chlorantha** (M.B.) Roem. et Schult., Syst. veget. VII (1829) 551; Ldb. Fl. Ross. IV, 142; Boiss. Fl. Or. V, 209; Shmal'g., Fl. II, 504 p.p.; Miscz., Fl. Cauc. cr. II, 4 (1912) 175. — Ornithogalum chloranthum M.B. Fl. taur.-cauc. III (1819) 264. — G. caucasica Stapf, Bot. Ergebn. der Polakscn. Exp. I (1885) 15. — Exs.: Pl. or. exs. No. 105 (var. Hohenackeri).

Perennial; bulb solitary, oblong-globose, rarely bulbs (and radical leaves) 2 (v. bibulbosa Grossh.); tunics membranous; collar none; stem 5–15 cm long, 2–5-flowered, or rarely 3–7 cm long and 1–3-flowered (v. Hohenackeri Miscz.); radical leaf narrowly linear to subfiliform (v. Hohenackeri Miscz.), overtopping the inflorescence, canaliculate above, carinate beneath, bilaterally lined, ciliolate-pubescent; lower cauline leaves narrowly lanceolate to filiform, successively diminishing and passing into bracts; pedicels long, firm, greatly elongating in fruit; perianth segments 9–12 mm long, golden-yellow within, green outside, oblong-oblanceolate, obtuse, becoming half as long again in fruit; capsule oblong-obovoid. March-April. (Plate VIII, Figure 13).

Dry exposed and gravelly places, scrub margins, in plains and in the lower mountain zone. — Caucasus: Cisc., Dag., E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm. **Gen. distr.**: Arm.-Kurd., Iran. Described from Kizlyar. Type in Leningrad.

59. **G. anisopoda** M. Popov in Addenda, III, p. 737.

Perennial; bulb ovoid, medium size; tunics brownish, reticulate, produced into a narrow collar 10–15 mm long; stem 6–10 cm long; erect; plants in groups of several; radical leaf solitary, narrowly linear, ca. 1–1.5 mm broad, rather shallowly canaliculate above, carinate and bilaterally furrowed, glabrous, slightly overtopping the inflorescence; cauline leaves narrowly linear-capillary, abruptly diminishing in size and passing into bracts; flower solitary, oblong, or rarely 2 flowers; pedicels subflexuous; perianth 8–9 mm long, yellow within, green outside; segments linear-oblong, narrow, attenuate toward apex, cucullate. April. (Plate IX, Figure 5, a, b).

Dry plateaus with Acantholimon, in the middle mountain zone. — Centr. Asia: Mtn. Turkm. Endemic (possibly occurring in Iran). Described from western Kopet Dagh. Type in Tashkent.

60. **G. Alberti** Rgl. in A. H.P. VI, 2 (1879) 512.

Perennial; bulb ovoid; tunics reticulate, forming a firm long collar
104 reaching nearly up to inflorescence; radical leaf solitary, linear-filiform, overtopping the inflorescence, in lower part ciliolate-pubescent, glabrous above; cauline leaves linear-filiform, the lower one exceeding the inflorescence; inflorescence corymbose-racemose; pedicels erect, more or less ciliate-puberulous; perianth segments 10–12 mm long, lance-oblong, obtusish, pale yellow within, greenish whitish-margined outside; anthers linear-oblong. March. (Plate VIII, Figure 14, a, b).

Lower mountain zone. — Centr. Asia: Dzu.-Tarb. Endemic (probably occurring in Dzu.-Kash.). Described from Kuldja. Type in Leningrad.

Plate IX

1. Gagea Olgae Rgl.: a) bulb; b) perianth segments.— 2. G. ova Stapf: a) bulb; b) perianth segments.— 3. G. stipitata Merkl.: a) bulb; b) perianth segments.— 4. G. tenera Pascher: a) cauline leaf; b) perianth segments.— 5. G. anisopoda M. Popov: a) bulb; b) perianth segments.— 6. G. gageoides (Zucc.) Vved.: a) upper part of inflorescence; b) cauline leaf with axillary bulblet.— 7. G. pauciflora Turcz.: upper part of style and stigma.— 8. G. provisa Pascher; upper part of style and stigma.— 9. G. capillifolia Vved.— 10. Scilla bucharica Desjat.— 11. S. Roseni C. Koch: flower.— 12. S. Hohenackeri Fisch. et Mey.: a) flower; b) bracts.— 13. S. Winogradowii D. Sosn.: a) ovary.— 14. S. bifolia L., flower.— 15. S. sibirica Andr.: flower; a) ovary. 16. S. autumnalis L.: flower.— 17. S. japonica Baker: flower.— 18. S. Raievskayana Rgl. flower.

Cycle **Afghanicae** Grossh. — Pedicels unequal, slightly elongating after flowering; inflorescence racemose-umbellate.

61. **G. Olgae** Rgl. in A.H.P. III (1865) 292. — Ic.: Rgl. Izv. Obshch. Lyubit. Estest., Antr. i Etnogr. XXI, pt. 2, 116, Vol.XVIII (1876) 14–17, Vol.XX, 3 and 5 (sub. G. chlorantha). — Exs.: HFR No.1438. — H.F.A.M. No.53.

Perennial; bulb medium size, oblong; tunics gray, fibrous; collar none; stem 3–5 cm long, slender; plants in groups; radical leaves commonly 2, capillary, 0.5–1 mm broad, shorter to longer than perianth; cauline leaves 3–5, alternate, capillary-linear, gradually diminishing in size up the stem; stem up to flower and outer face of perianth segments finely puberulous; flower mostly solitary, rarely flowers 2 or 3 (8); perianth segments 5–9 mm long, bright yellow to nearly orange-yellow within, greenish outside, oblong, obtusish, the middle ones 3-nerved; anthers rounded-oblong, half as long again to twice as long as broad; ovary linear-oblong; first capsule 6–8 mm long, obovoid, one-half to two-thirds the length of perianth. March-April. (Plate IX, Figure 1, a,b,c).

Dry clay slopes, in plains and foothills. — Centr. Asia: Balkh., Kyz. K., Kara K., Mtn. Turkm., Amu D., Syr D., Pam.- Al., T. Sh. (?). Endemic (probably occurring in Iran). Described from Central Asia. Type in Leningrad.

107 62. **G. afghanica** Terr. in Bull. Soc. Ort. Palermo II (1904) 4; Pascher in Bull. Soc, Nat, Mosc. XIX (1905) 372. — G. stipitata var. purpurascens Bornm. et Sint. in P. Sintenis, Iter transcasp. pers. (1900–1901) ex p.

Perennial; bulb medium size, oblong; tunics gray, fibrous; collar none; stem 10–20 (25) cm long; plants commonly solitary, usually glabrous; radical leaf narrowly linear, 1–1.5 mm broad, rarely exceeding the inflorescence; cauline leaves 2–5, alternate, the upper ones reduced; inflorescence 3–25-flowered; pedicels slender, unequal; perianth segments 8–12 mm long, oblong-lanceolate, obtusish, pale green within, greenish outside; anthers linear-oblong, 3–4 times as long as broad; capsule spherical-obovoid, one-third shorter than perianth segments, the first 10–15 mm long. March-April.

Sands. — Centr. Asia: Kyz. K., Kara K., Amu D., Pam.-Al. **Gen. distr.**: Iran. Described from Afghanistan. Type in Geneva.

63. G. Vvedenskyi Grossh. sp. nova in Addenda III, p.737.

Perennial; bulb ovoid-oblong; tunics gray, fibrous, longitudinally separating below into fibers, reticulate-fibrillose at the top; collar none; stem 5–15 cm long; stem, leaves and pedicels glabrous; radical leaf narrowly linear, rarely to 2–3 mm broad, shorter to slightly longer than the stem; cauline leaves few, narrowly linear, gradually diminishing in size up the stem; inflorescence 2–3-flowered; pedicels long, unequal; flower often solitary; perianth segments oblong-oblanceolate, (9) 12–16 mm long, broader in upper part but acuminate at apex; pale yellow or sometimes nearly whitish within, the outer face more or less tinged with violet-purple; stamens half the length of perianth; anthers small, oblong; capsule two-thirds the length of perianth, obovoid-oblong, narrow, obtusely 6-angled, April-May-June. (Plate VI, Figure 19).

From the middle mountain zone to alpine altitudes, on grassy slopes. — Centr. Asia: Syr D., Pam.-Al., T. Sh. Endemic. Described from Central Asia. Type in Tashkent.

64. **G. altaica** Schischk. et Sumn., Animadv. Syst. ex Herb. Tomsk., No. 8 (1928); Kryl., Fl. Zap. Sib. III (1929) 603.

Perennial; bulb ovoid, medium size; tunics grayish-brown; produced into a collar 10–20 mm long; stem erect, 3–13 cm long, glabrous or short-haired; basal leaf narrowly linear to subcapillary, conduplicate, equaling to twice as long as the stem; cauline leaves 1–3, slenderly linear, diminishing in size up the stem; flower 1 or 2, rarely 3–5; pedicels erect, slender; perianth segments 10–12 mm long, 2.5–4.5 mm broad, oblong to
108 oblong-ovoid, obtusish, golden-yellow within, greenish-brown outside, commonly reddish-tinged; stamens one-third shorter than perianth; ovary prismatic. April. (Plate VIII, Figure 12a).

Stony, sandy, or steppe slopes. — W. Siberia: Alt.; E. Siberia: Ang.-Say. Endemic. Described from Altai. Type in Tomsk.

Cycle **Bulbiferae** Grossh. — Bulblets formed in the axils of all or merely of upper leaves; inflorescence racemose.

65. **G. bulbifera** (Pall.) Roem. et Schult. Syst. veget. VII (1829) 552; Ldb. Fl. Ross. IV, 142; Boiss. Fl. Or. V, 210; Shmal'g., Fl. II, 502; Miscz., Fl. Cauc. cr. II, 4 (1912) 174; Kryl., Fl. Zap. Sib. III, 600. — Ornithogalum bulbiferum Pall. Reise, II Anhang (1773) 736. — Ic.: Pall. l.c. tab. 2 (1773); Rchb. Ic. Fl. Germ. (1848) 1056. — Exs.: HFR. No. 1187.

Perennial; bulb medium size, ovoid, 4–5 mm long; tunics brownish-gray; collar none; stem 3–12 (15) cm long, slender, densely canescent, especially at base; lower leaves slenderly filiform, semicylindric, shorter than inflorescence; cauline leaves 3–5 gradually diminishing in size up the stem, tuberously inflated at base, with a small bulblet inside the swelling, slenderly filiform; inflorescence 1–3-flowered; pedicels slender, nutant before anthesis; perianth segments 7–12 mm long, 1.5–2 mm broad, lanceolate, attenuate toward apex, bright yellow within, greenish and yellow-margin outside; stamens one-fourth to one-third shorter than perianth segments; anthers linear-oblong; capsule ovaloid, rounded-trigonous, half the length of perianth segments. March-April-May. (Plate VIII, Figure 11a).

Steppes; dry stony and gravelly slopes, and solonetz soils. — European part: Bl., Crim., L. Don, L. V.; Caucasus: Cisc., S. and E. Transc., Tal.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh., T. Sh. **Gen. distr.**: Arm.-Kurd., Iran., Dzu.-Kash., Mong. (?). Described from Astrakhan. Type in Leningrad.

66. **G. pamirica** Grossh. sp. nova in Addenda III, p. 738.

Perennial; bulb solitary; tunics thinly membranous, produced into a slender collar 8–20 mm long; stem 4–9 cm long; radical leaf slightly exceeding the stem, narrowly linear; cauline leaves 1 or 2, also narrowly linear; leaves on upper part of stem below the inflorescence strongly reduced, short, subfiliform, with bulblets in their axils, conspicuously differing

from lower leaves; flower as a rule solitary; perianth segments 9–10 mm long, lanceolate, obtusish, yellow with a broad green dorsal band; anthers oblong. July. (Plate VI, Figure 18).

Grassy and gravelly slopes in the alpine zone, up to 4350 m. — Centr. Asia: Pam.-Al., T. Sh. Endemic. Described from Pamirs. Type in Leningrad.

Cycle **Pseudoamblyopetalae** Grossh. — Radical leaves filiform; cauline leaves with enlarged lanceolate base; inflorescence cymose.

109 67. **G. tenera** Pascher in Lotos, N.F. XXIV (1904) 128. — G. amblyopetala Vved. in Opred. rast. okr. Tashkenta (1924) 62, non Boiss. et Heldr. — G. bithynica Miscz., Fl. Cauc. cr. II, 4 (1912) 169, non Pascher.

Perennial; bulb small, ovoid; tunics blackish-brown; stem erect, slender, 5–15 cm long; plants in groups of several; radical leaf solitary (rarely 2), filiform, rather shallowly canaliculate, overtopping the inflorescence; lower cauline leaf slender, lanceolately enlarged at base, amplexicaul; other leaves filiform, gradually diminishing in size up the stem and passing into bracts; inflorescence 1–3-flowered; pedicels long, slender, filiform, erect and indurated in fruit; perianth segments (6)-8–9 mm long, yellow within, greenish outside; capsule obovoid, half the length of perianth. March-April. (Plate IX, Figure 4 a, b).

Loess and gravelly slopes in plains and foothills. — Caucasus: E. Transc. (rare); Centr. Asia: Balkh., Kara K., Syr D., Pam.-Al., T. Sh. Endemic. Described from the vicinity of Tashkent. Type in Leningrad.

Subsection 2. STIPITATAE Pascher, Bull. d. l. Soc. Nat. Moscou XIX (1907). — Ovary obovoid or obcordate, narrowed at base into a short stipe.

Series **Eustipitatae** Grossh. — Flowers relatively large.

68. **G. stipitata** Merklin ex Bunge in Mém. Acad. Pétersb. VII (1851) 512. — Ic.: Rgl. in Izv. Obshch. Lyubit. Estest., Antr. i Etnogr. XXI, pt. 2 (1876) 116, tab. XIX, I, 5–8. — Exs.: HFR No. 1439 pp. H. F. A. M. No. 55.

Perennial; bulb globose-ovoid, small, commonly solitary or bearing several small puncticulate-tuberculate subsidiary bulblets; tunics blackish-brown, coriaceous; collar none; stems glabrous, 5–20 cm long, slender, strongly branched; radical leaf slenderly linear, shorter than inflorescence; cauline leaves narrowly linear, little enlarged toward base, gradually passing into bracts; pedicels slender, subcapillary, much longer than flower; perianth segments yellow within, greenish outside; capsule two-thirds the length of perianth. March-April, (Plate IX, Figure 3 a, b).

Loess plains and foothills, on dry slopes. — Caucasus: S. Transc.; Centr. Asia: Balkh., Kyz. K., Kara K., Mtn. Turkm., Amu D., Syr D., Pam. Al., T. Sh. Gen. distr.: Iran., Ind.-Him. Described from Central Asia. Type in Leningrad.

69. **G. ova** Stapf, Botan. Ergebn. der Polak'schen Expedition nach Persien, I (1885) 16. — Ic.: Rgl., Izv. Obshch. Lyub. Estest., Antr. i
110 Etnogr. XXI, 2, 116, tab. XX, f. 6 (sub G. chlorantha). — Exs.: HFR No. 1439 (sub G. stipita) p.p.

Perennial; bulb ovoid-globose, small, with numerous small faveolate-pitted lateral bulblets in a common sheath; tunics dark brown, firm; collar none; stems 6–25 cm long, strongly branched; radical leaf solitary, narrowly linear; cauline leaves scarcely enlarged at base, gradually diminishing in size up the stem and passing into bracts; pedicels numerous, much longer than flower; perianth segments (6) 8–12 mm long, linear-oblanceolate, obtusish, pale yellow to nearly white; capsule obovoid, two-thirds the length of perianth. March-April. (Plate IX, Figure 2a).

Clayey places, among crops, and on dry slopes, in plains and foothills. — Centr. Asia: Ar.-Casp., Balkh., Kara K., Mtn. Turkm., Syr D., Pam.-Al., T. Sh. **Gen. distr.**: Iran. Described from Iran. Type in Vienna.

70. **C. capillifolia** Vved. in Opred. rast. okr. Tashkenta, I (1923) 60; Fl. Turkm., I, 2 (1932) 232.

Perennial; bulbs 2, one much smaller than the other, in a common sheath; tunics thin, light brown; stem 8–12 cm long, slender, weak, flexuous, commonly terminating in a solitary flower, rarely in 2 flowers; radical leaves 2, finely hairy, commonly shorter than flower; lowest cauline leaf narrowly linear, shorter than flower; other cauline leaves strongly reduced; plants in groups containing numerous many-leaved sterile specimens and few fertile ones; perianth segments (6) 8–9 mm long, oblanceolate, obtuse, pale yellow on both sides; anthers ovaloid-globose; ovary stipitate. April-July. (Plate IX, Figure 9).

Gullies and in the shade of rocks, in the alpine mountain zone. — Centr. Asia: Mtn. Turkm., Pam.-Al., T. Sh. Described from Tashkent area. Type in Tashkent.

Series **Minutiflorae** Grossh. — Flowers small, 3–5 mm long, numerous, in a strongly branched inflorescence.

71. **G. gageoides** (Zucc.) Vved., Fl. Turkm., 1, 2 (1932) 261. — Bulbillaria gageoides Zucc. in Abh. Akad. Wiss. Bay. 3 (1843) 229, t. 2, f. 1. — G. persica Boiss. Diagn. Ser. 1, VII (1846) 108; Fl. Or. V (1884) 210. — Ic.: Rgl., Izv. Obshch. Lyub. Est., Antr. i Etnogr. XXI, 2 (1876) tab. XVII, sub G. amblyopeta.

Perennial; bulb medium size, ovoid; tunics light brown, coriaceous; second bulb small, directed downward; stem flexuous, strongly branched, 7–25 cm long; radical leaf solitary, narrowly linear, subcapillary; lowest cauline leaf linear-lanceolate, to 4–5 mm broad, much larger than the rest; other cauline leaves numerous, short, with usually several bulblets crowded
111 in the axils, rarely bulblets absent (G. baldshuanica Lipsky in schedis). Flowers few; pedicels long and slender; perianth segments 4–6 mm long, oblong-lanceolate, obtusish, yellow within, pale yellow outside, scarcely green-tinged; capsule about half the length of perianth, obconical. April-May. (Plate IX, Figure 6, a, b).

Dry slopes, gravelly places, etc., chiefly in foothills and in the middle mountain zone. — Centr. Asia: Ar.-Casp. (rare), Mtn. Turkm., Syr D., Pam. Al., T. Sh. Gen. distr.: E. Med. (?), Iran. Described from Iran. Type in Geneva (?).

72. **G. minutiflora** Rgl. in A.H.P. III (1875) 291–292. — Ic.: Rgl. in Izv. Obshch. Lyub. Estestv., Antr. i Etnogr. XXI, pt. 2, 113, Plate XVIII (1876) f. 7–12. — Exs.: H.F.A.M. No. 52.

Perennial; bulb small, globose-ovoid; tunics brownish; stem 2–7 cm long, slender, in upper part strongly branched; radical leaf solitary, rarely 2 or none (v. aphylla Grossh.), slenderly filiform, equaling to slightly exceeding the inflorescence; lowest cauline leaf borne about the middle or even in upper one-third of the stem, lanceolate, enlarged at base and subamplexicaul, to 5–6 mm broad; other cauline leaves abruptly diminishing in size, slenderly filiform, passing into bracts; inflorescence branched, many-flowered; pedicels subcapillary, 2–3 times the length of flower; perianth segments 3–4 (6) mm long, narrowly oblong, obtuse, yellow within, greenish outside; capsule about half the length of perianth segments, obovoid-cordate, emarginate at the top, trigonous with rounded-convex angles. April-May-June. (Plate VIII, Figure 16 a).

Grassy and gravelly slopes in the alpine zone, rarely in the middle mountain zone. — Centr. Asia: Mtn. Turkm. (rare), Pam.-Al., T. Sh. Endemic. Described from Karatau Mts. Type in Leningrad.

Section 2. **PLECOSTIGMA** (Turcz.) Pascher, Bull. Soc. Nat. Moscou XIX (1905) 374. — Plecostigma Turcz. in Trautv. Plant. imag. (1844) 8. — Stigma 3-lobed.

73. **G. pauciflora** Turcz. in Bull. Soc. Nat. Moscou I (1838) 102, nomen, Ldb. Fl. Ross. IV, 143. — Plecostigma pauciflorum Turcz., Bull. Soc. Nat. Mosc. XXVII, 2 (1854) 113.

Perennial; bulb 5–6 mm long, ovoid; tunics brownish-gray, forming a collar 10–15 mm long; stem 8–10 cm long, glabrous or beset at base with short spreading hairs (v. puberula Krylov); leaves alternate; radical leaf about equaling the stem; other leaves short, diminishing in size up the stem, linear, 1–1.5 mm broad, up to 7 cm long, white-hyaline-margined, scarcely enlarged at base; flowers 1–3 (rarely up to 5), in racemose arrangement; perianth segments pale yellow within, greenish outside, linear-oblong, 13–15 mm long, widely spreading in anthesis;
112 stamens two-thirds the length of perianth; anthers linear-oblong; ovary trigonous; style about as long as ovary, 3-lobed to the middle or lower down. April-May. (Plate IX, Figure 7).

Dry exposed mountain slopes and solonetz soils. — E. Siberia: Ang.-Say., Lena-Kol., Dau.; Far East: Ze.-Bu., Uss. **Gen. distr.**: Jap.-Ch. Described from Siberia (Angara River). Type in Leningrad.

74. **G. provisa** Pascher in Fedde, Repert. sp. nov. I (1905) 195.

Perennial; bulb 4–5 mm long, ovoid; tunics brownish-gray, forming a short collar; stem 5–12 cm long, glabrous; radical leaf narrowly linear, about equaling the inflorescence; cauline leaves alternate, gradually

diminishing in size, narrowly linear; flowers 1–3, in racemose arrangement; perianth segments yellow within, green outside, linear-oblong, 9–12 mm long; stamens two-thirds the length of perianth; anthers linear; ovary trigonous; style about as long as ovary, parted at the very apex into 3 short lobes. May-June. (Plate IX, Figure 8).

Dry slopes and scrub. — E. Siberia: Ang.-Say., Lena-Kol., Dau. Endemic. Described from the vicinity of Yakutsk. Type in Leningrad.

Genus 267. **ALLIUM*** L.**

L. Gen. pl. ed. 5 (1754) 143; Ldb. Fl. Ross. IV (1853) 161; Boiss. fl. Or. V (1884) 229.

Perianth segments distinct or more or less connate, 1–7-nerved, commonly persistent after anthesis, undergoing transformation or not so; stamens 6, more or less connate and adnate to perianth; anthers dorsifixed; ovary 3-locular or 1-locular, with 6 or numerous ovules; style inserted at the base of ovary, persistent; seeds angled or terete.

Perennial (cultivated forms sometimes biennial), bulbose or nearly bulbless plants, with strong onionlike or garliclike odor and taste; inflorescence umbelliform, initially inclosed in a spathe.

Certain species of Allium have long been in cultivation for their taste or aroma, but in many localities wild species are also used for foods. Records exist concerning the use of A. paradoxum, A. sabulosum, A. monadelphum, A. schoenoprasum, A. saxatile, etc. Most widely used are, however, A. victorialis and A. ursinum, the two species not being distinguished by the population and known under the common name 'cheremsha", as well as species closely related to cultivated ones, such as A. altaicum, A. Oschanini, A. pskemense, and A. longicuspis. This certainly does not exhaust the list of potentially edible species.

It seems, however, that species of the section Molium are not edible,
113 but many of them may be used as ornamental plants, and the most attractive among them (A. giganteum, A. Christophii) are very much in demand by foreign florist establishments. In great demand is also A. coeruleum.

The garliclike taste of Allium is due to the presence of garlic oil (0.005–0.009%, according to Remer, on whole plant basis), the chief constituent being a disulfide $C_6H_{12}S_2$ with a high sulfur content.

Garlic plants are not always desirable in pasture, even as normal admixture to common grass forage, since many of the species impart an unpleasant flavor to the milk.

The genus Allium, as conceived up till now and treated in the Flora of the USSR, represents a very unnatural composite group, the division into sections also being highly artificial. The large number of species (more than 400 on global scale) and the absence of many of them in the herbaria at the author's disposal, as well as the limited knowledge concerning the garlics of China and Hither Asia which represent massive centers of Allium formation, obliged him to refrain from introducing any changes in the now accepted Allium system of Don and Regel†. The only

* Allium or Alium, the name for garlic used by ancient Roman writers.

** Arranged by A.I. Vvedenskii.

† Don, a Monograph of the Genus Allium.— Mem. Werner. Nat. Hist. Hist. Soc. VI (1832) 1–102. Regel, Alliorum adhuc cognitorum Monographia.— A.H.P., III, 2 (1875) 1–226.

exception made concerns a small number of markedly isolated species which were recently subjected to a detailed treatment by Prokhanov**.

Apart from missing species, the backward state of Allium systematics is also due to the lack of many characters in the species preserved in herbaria. Allium plants should be carefully dug out for collection, so as to retain the complete clump in the case of cespitose species and to avoid the loss of the outer bulb tunics and of bulblets, when present. It is also essential, before drying, to prepare drawings of the cross section of leaf in two positions: above the base and above the middle. Very important characters are associated with the spathe before opening; it is therefore desirable to include in collection both flowering specimens and less advanced plants with spathe still unopen.

With properly collected material, the identification of Allium species does not usually present any difficulty.

1. Perianth segments 3–7-nerved; pedicels below the flower enlarged into a disk; innermost (upper) leaf vaginate, long-sheathing (Section Nectaroscordum) . . . . . 2.
+ Perianth segments 1-nerved; all leaves with blade or only outer (lower) leaves vaginate . . . . . 3.

114 2. Disk ca. 5 mm broad; perianth segments persistent . . . . . 228. A. **Dioscoridis** Sibth. et Sm.
+ Disk ca. 3 mm broad; perianth segments deciduous . . . . . 227. A. **tripedale** Trautv.

3. Leaf blade lanceolate, oblong or broadly elliptic, gradually or more or less abruptly narrowed into petiole; seeds globose or subglobose; capsule globose-trigonous, with broadly obcordate valves . . . . . 4.
+ Leaves filiform, semicylindric, cylindric, linear, lorate, or lanceolate to broadly elliptic, never narrowed into petiole; seeds angled . . . . . 5.

4. Bulb attached to rhizome, with reticulate tunics; scape clothed in sheathing leaves up to 1/3–1/2 its length; perianth segments 4–5 mm long (Section Anguinum) . . . . . 1. A. **victorialis** L.
+ Bulb not attached to rhizome; bulb tunics separated into fibers; scape clothed at base in leaf sheaths; perianth segments 9–12 mm long (Section Ophioscordon) . . . . . 2. A. **ursinum** L.

5. Strong plants with stem 7–20 mm thick and fistulous leaves; bulb tunics (in wild plants) reddish-brown, subcoriaceous, entire; flowers white or yellowish in a spherical or hemispherical many-flowered dense umbel. . . . . 6.
+ Scape commonly less than 7 mm thick and, if plants strong with thicker scape, then leaves broad and flat, not fistulous . . . . . 12.

6. Perianth stellate, white, the segments 4–6 mm long; pedicels subtended by bracteoles (Section Cepa) . . . . . 9.
+ Perianth campanulate, yellowish, the segments 6–8 mm long; pedicels ebracteolate (Section Phyllodolon) . . . . . 7.

7. Relatively small plants, 20–25 cm tall; scape 7–10 mm thick; leaves 5–7 mm broad . . . . . 86. A. **microbulbum** Prokh.
+ Larger plants, 30–70 and more cm tall; scape and leaves thicker . . . 8.

8. Pedicels stout; slightly shorter than or (the central ones) half as long again as perianth; umbel subcapitate . . . . . 87. A. **altaicum** Pall.

* Prokhanov, Kul'turnye luki Kitaya i Yaponii (Cultivated Garlics of China and Japan).– Tr. Prikl. bot., gen. i selek. XXIV (1930) 123–188.

+ Pedicels slender, 2–3 times the length of perianth; umbel relatively loose; cultivated plants . . . . . 88. **A. fistulosum** L.

9. Scape inflated or slanting-inflated; leaves 2 or 3; filaments of stamens connate above the part fused with perianth . . . . . 10.

+ Scape more or less conspicuously inflated below the middle; leaves 4–9; filaments distinct above the part fused with perianth . . . . . 11.

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10. Scape solid, 20–50 cm long; leaves 3–10 mm broad; perianth segments 4–5 cm long . . . . . 89. **A. galanthum** Kar. et Kir.

+ Scape hollow, 40–80 cm long; leaves 20–30 mm broad; perianth segments 6 mm long . . . . . 90. **A. pskemense** B. Fedtsch.

11. Leaves flattened, canaliculate, close to scape base, recurved . . . . . 91. **A. Vavilovi** M. Pop. et Vved.

+ Leaves cylindric, erect . . . . . 12.

12. Scape slender above the inflated part; wild-growing plants . . . . . 92. **A. Oschanini** O. Fedtsch.

+ Scape fairly thick above the inflated part; a cultivated plant . . . . . 93. **A. cepa** L.

13. Bulbs cylindric, conical, oblong or rarely oblong-ovoid to ovoid, solitary or clustered, always attached to rhizome (Section Rhiziridium) . . . . . 14.

+ Bulbs globose or ovoid or rarely oblong-ovoid, devoid of rhizome . . . . . 96.

14. Filaments one-fourth to three-fourths as long as perianth segments, adnate for half their length with perianth and connate to 2/3–3/4 their length. . . . . 15.

+ Filaments shorter or longer than perianth, connate for part of the length equal to that adnate to perianth . . . . . 17.

15. Leaves 0.5–1 mm broad, semicylindric, canaliculate; perianth segments rosy-violet, 5–6 mm long; filaments 1/4–1/3 shorter than perianth segments . . . . . 79. **A. Veschniakovi** Rgl.

+ Leaves 2–15 mm broad; perianth segments 7–15 mm long, lustrous, yellow or at length becoming red or dark purple; filaments one-fourth to one-half the length of perianth segments . . . . . 16.

16. Leaves (2) 3, broadly linear, canaliculate, 5–15 mm broad, not fistulous . . . . . 80. **A. Semenovi** Rgl.

+ Leaves 1–2–(3), cylindric, fistulous, 2–7 mm broad . . . . . 81. **A. monadelphum** Less.

17. Leaves 1 or 2, fistulous; perianth segments rose to rosy-violet, commonly lustrous; bulb tunics without distinct nerves, shelly-coriaceous to subchartaceous, brittle; spathe nearly beakless . . . . . 18.

+ Leaves (2)–3–9, not fistulous, or if fistulous then spathe long-beaked or leaves canaliculate-triquetrous. . . . . 21.

18. Filaments one-third to one-half the length of perianth; pedicels half as long as to rarely equaling the perianth . . . . . 82. **A. schoenoprasum** L.

+ Filaments somewhat longer, two-thirds as long as to equaling the perianth segments; pedicels (half as long again) to 2–3 times as long as perianth segments . . . . . 19.

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19. Perianth segments 7–12 mm long; style strongly exserted . . . . . 83. **A. Ledebourianum** Roem. et Schult.

+ Perianth segments 5–6–(7) mm long; style little exserted . . . . . 20.

20. Bulb tunics grayish, subchartaceous; inner filaments gradually attenuate from base, half as broad again at base as the outer ones. . . . . 84. **A. Maximowiczii** Rgl.

+ Bulb tunics tawny-brown or violet-brown, shelly-coriaceous; filaments subulate from scarcely dilated base, subequal . . . . . 85. **A. oliganthum** Kar. et Kir.

21. Leaves canaliculate-triquetrous or prominently carinate, 2–5 mm broad; filaments half as long again as perianth segments; perianth ellipsoid; segments elliptic, obtuse, rosy-purple or dingy rose, darker on the back, 4–5.5 mm long . . . . . 22.

+ Leaves flat or semicylindric, ecarinate, if carinate then filaments shorter than perianth segments . . . . . 23.

22. Leaves (2)–3–(4), canaliculate-triquetrous, sometimes fistulous at base; bulb oblong-ovoid; tunics splitting, obscurely reticulate-fibrillose, sheathing the stem base; perianth segments rosy-purple, 4.5–5.5 mm long . . . . . 3. **A. succuliferum** Maxim.

+ Leaves 4–7, canaliculate, prominently carinate; bulb ovoid, with coriaceous entire tunics; perianth segments dingy rose, darker on the back, 4–4.5 mm long . . . . . 4. **A. Komarovianum** Vved.

23. Bulb tunics papery, membranous or coriaceous, splitting or separating into fibers; sometimes obscurely reticulate-fibrous and then spathe beakless and roots numerous and nearly stringy, but never reticulate. . . . . 24.

+ Bulb tunics reticulate or reticulate-fibrous or if obscurely reticulate-fibrous then spathe more or less long-beaked . . . . . 59.

24. Filaments connate and adnate to perianth for half their length, about half as long again as perianth; umbel fasciculate, few-flowered, loose. . . . . 59. **A. setifolium** Schrenk.

+ Filaments connate and adnate to perianth for one-fourth their length. . . . . 25.

25. Bulb ovoid-conical or subcylindric; tunics numerous, coriaceous, firm, entire; spathe more or less long-beaked, the beak sometimes several times as long as the blade, or spathe beakless and then plants small, with a slender scape 10–15 cm long and purple flowers; filaments longer or (in A. Alexandrae) shorter than perianth segments . . . . . 26.

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+ Spathe beakless or terminating in a very short beak and then filaments shorter than perianth . . . . . 39.

26. Filaments slightly shorter than perianth, the inner ones dilated to 3/4 the length and abruptly attenuate to subsetaceous, 3 times as broad as the subulate outer filaments . . . . . 73. **A. Alexandrae** Vved.

+ Filaments slightly shorter than or about half as long as perianth segments, subulate nearly from base, equal or the inner ones to half as broad again . . . . . 27.

27. Filaments slightly exceeding the perianth; perianth substellate, rosy-purple; umbel loosely few-flowered . . . . 60. **A. subtilissimum** Ldb.

+ Filaments (one-fourth) half as long again to twice as long as perianth segments; perianth ovoid-campanulate or campanulate . . . . . 28.

28. Umbel fasciculate-hemispherical, few-flowered, loose, with nodding flowers; perianth segments ca. 3 mm long, pale yellow turning rosy; pedicels half as long again to twice as long as perianth . . . . . 62. A. tytthanthum Vved.

\+ Umbel spherical or hemispherical, dense, many-flowered, or if few-flowered then pedicels shorter than or only slightly exceeding the perianth and flowers rose or purple . . . . . 29.

29. Perianth segments 5–6 mm long, obtuse, the outer emarginate, the inner 1/6 longer; pedicels slightly shorter to slightly longer than perianth; scape 10–25 cm long . . . . . 66. A. tianschanicum Rupr.

\+ Perianth segments 3–5 mm long, acute or obtuse and mucronate, the inner shorter than the outer . . . . . .30.

30. Pedicels short, equal, very rarely to half as long again as the perianth; beak of spathe relatively short, usually shorter than the blade to rarely twice as long, or spathe beakless; flowers rose or purple . . .31.

\+ Pedicels half as long again to 3–(4) times as long as perianth; beak of spathe usually several times the length of blade, or if beak relatively short then flowers yellow . . . . . 34.

31. Spathe beakless; perianth segments purple; leaves flat, smooth . . . . . 61. A. jucundum Vved.

\+ Spathe beakless; perianth segments purple; leaves semicylindric canaliculate . . . . . .32.

32. Inner filaments half as broad again as the outer, 2-toothed at base. . . . . 63. A. kokanicum Rgl.

\+ Filaments equal, subulate . . . . . 33.

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33. Leaves subcapillary, 0.25–0.5–(1) mm broad, smooth or rarely scaberulous; filaments commonly faint-colored. . . . . 64. A. filifolium Rgl.

\+ Leaves 0.5–1 mm broad, with ciliate-scabrous margin; filaments commonly purple . . . . . 65. A. caricoides Rgl.

34. Flowers pale yellow; perianth segments obtusish or obtuse, mucronate, 4–5 mm long . . . . . .35.

\+ Flowers white, rose or rose purple, or if pale yellowish-green turning rosy then perianth segments 3–4 mm long; perianth segments acute. . . . . 36.

35. Leaves 0.5–1 mm broad; bulb tunics grayish or brownish, coriaceous to subchartaceous . . . . . 68. A. petraeum Kar. et Kir.

\+ Leaves 1–2.5 mm broad; bulb tunics subcoriaceous, brown, often lustrous . . . . . 67. A. condensatum Turcz.

36. Perianth segments 3–4 mm long, pale yellowish-green turning rosy. . . . . 69. A. talassicum Rgl.

\+ Perianth segments 4–5 mm long, white, rose or rosy-purple . . . . . 37.

37. Perianth segments rosy-purple . . . . . 72. A. globosum MB.

\+ Perianth segments white or rose. . . . . 38.

38. Perianth segments rose; anthers commonly violet . . . . . 71. A. saxatile MB.

\+ Perianth segments white; anthers commonly yellow . . . . . 70. A. Marschalianum Vved.

39. Rhizome with offshoots; bulbs obsolescent; umbel containing few large nodding flowers 6–7 mm long; filaments 1/4–1/3 shorter than perianth segments, the inner ones about 3 times as broad as the outer . . . . . 52. A. caespitosum Sievers.

+ Rhizome without offshoots; inner filaments not more than twice as broad as the outer, and if broader than filaments exceeding the perianth . . . . . 40.

40. Filaments 1/4–1/3 shorter than perianth segments, dilated at base, entire; perianth segments 3.5–4.5 mm long, obtuse or truncate, obcuneate . . . . . 41.

+ Filaments equaling to twice as long as perianth segments, or if shorter than perianth segments then the latter 5–6–(7) mm long and acute, or if obtuse then the filaments 2-toothed at 2/3–3/4 the length from base . . . . . 42.

41. Umbel hemispherical, few-flowered; flowers nodding; pedicels subequal, half as long again to 2–(3) times as long as perianth segments; scape 5–25 cm long; perianth hemispherical; inner segments
119 obconical-cuneate, the outer ones rounded-elliptic. . . . . 50. **A. tenuissimum** L.

+ Umbel fasciculate or fasciculately hemispherical, commonly many-flowered; pedicels unequal, 3–7 times the length of perianth; scape 20–40 cm long; perianth broadly campanulate; inner perianth segments obcuneate to linear-obcuneate, the outer ones broadly elliptic to oblong-elliptic . . . . . 51. **A. anisopodum** Ldb.

42. Compactly cespitose plants, 10–25 cm tall, with numerous nearly ropy roots; bulbs obsolescent, ca. 0.5 cm thick, the tunics divided into parallel strips or obscurely reticulate fibers . . . . . 43.

+ More robust plants, 30–100 cm tall, cespitose or not cespitose, or plants small cespitose, but then never with numerous ropelike roots. . . . . 45.

43. Bulb tunics separated into reticulate fibers; inner filaments dilated at base, mostly 2-toothed . . . . . 47. **A. polyrrhizum** Turcz.

+ Bulb tunics separated into parallel strips; inner filaments with 2 teeth at 2/3–3/4 their length . . . . . 44.

44. Umbel hemispherical or spherical, dense; pedicels equaling to half as long again as the perianth; filaments slightly shorter than perianth segments; leaves 1–1.5 mm broad . . . . . 48. **A. bidentatum** Fisch.

+ Umbel loosely hemispherical, flowers subpendulous; pedicels half as long again to twice as long as perianth; filaments equaling the segments; leaves ca. 0.5 mm broad. . . . . 49. **A. bellulum** Prokh.

45. Bulb tunics coriaceous . . . . . 46.

+ Bulb tunics membranous, and if coriaceous then leaves semicylindric, canaliculate, close to scape base . . . . . 50.

46. Filaments slightly exceeding the perianth segments; segments linear-oblong, obtuse, rose with a prominent purple nerve, 4 mm long; umbel dense, capitate; bulbs 0.75–1 cm thick, 2–3 cm long, attached singly to rhizome; rhizome ascending, covered with vestiges of old bulbs. . . . . 58. **A. glaciale** Vved.

+ Filaments half as long again to twice as long as perianth segments; bulbs 1–3 cm thick, in clusters of several, or if solitary then flowers greenish-yellow . . . . . 47.

47. Perianth segments greenish-yellow; leaves 6–9, broadly linear, 5–20 mm broad, gradually attenuate toward apex; bulb solitary. . . . . 53. **A. obliquum** L.

120 + Perianth segments rose; leaves with nearly parallel margins; bulbs more or less clustered . . . . . 48.

48. Bulb tunics not lustrous, entire; inner filaments 2–3 times as broad at base as the outer; leaves broadly linear, commonly falcately recurved. . . . . 55. **A. polyphyllum** Kar. et Kir.

\+ Bulb tunics lustrous, splitting; filaments nearly equal at base; leaves narrowly linear, erect . . . . . 49.

49. Pedicels two-thirds as long as to equaling perianth; perianth segments pale rose-lilac with a prominent darker nerve . . . . . 57. **A. kaschianum** Rgl.

\+ Pedicels half as long again to twice (3 times) as long as perianth segments; segments a handsome pink, faintly nerved . . . . . 56. **A. hymenorrhizum** Ldb.

50. Perianth segments linear-lanceolate to lanceolate, 6–8 mm long, rose; leaves broadly linear, flat . . . . . 54. **A. platyspathum** Schrenk.

\+ Perianth segments 3–6 mm long, oblong, elliptic or ovate . . . . . 51.

51. Leaves smooth, linear, flat or carinate; flowers rose or rose-violet; plants loosely cespitose or bulbs attached singly to rhizome . . . . . 52.

\+ Leaves scabrous, semicylindric, often subfiliform, or flattish and smooth and then flowers white; plants commonly densely cespitose . . . . . 54.

52. Filaments slightly exceeding to one-fourth as long again as perianth segments; segments acute; leaves carinate . . . . 37. **A. angulosum** L.

\+ Filaments slightly exceeding to half as long again as perianth segments; segments obtuse; leaves flat . . . . . 53.

53. Filaments half as long again to twice as long as perianth segments, the inner ones half as long again as the outer, commonly 2-toothed. . . . . 45. **A. nutans** L.

\+ Filaments slightly exceeding to half as long again as perianth segments; inner filaments half as broad again at base as the outer, entire. . . . . 44. **A. senescens** L.

54. Perianth segments rose-violet or purple . . . . . 55.

\+ Perianth segments white or yellow, sometimes rose-tinged . . . . . 57.

55. Perianth segments purple; pedicels slightly shorter to slightly longer than perianth; leaves 2–4. . . . 43. **A. tytthocephalum** Roem. et Schult.

121 + Perianth segments rose-violet; pedicels 2–3 times as long as perianth; leaves 5–8 . . . . . 56.

56. Style not exserted; perianth segments broadly elliptic to ovate, nearly entire. . . . . 42. **A. rubens** Schrad.

\+ Style exserted; perianth segments oblong or rarely oblong-ovate, the inner ones more or less crenate . . . . . 41. **A. prostratum** Trev.

57. Leaves filiform, 0.5–0.75 mm broad; perianth segments yellowish, 3–4 mm long, oblong-lanceolate to oblong; pedicels 2–3–(4) times as long as perianth. . . . . 39. **A. flavescens** Bess.

\+ Leaves 0.75–2–(4) mm broad; perianth segments white or yellow, sometimes rose-tinged, 4–5 mm long, oblong, ovate or broadly elliptic; pedicels half as long as again to twice as long as perianth. . . . . 58.

58. Perianth segments white, flattish; filaments equaling to twice as long as perianth . . . . . 38. **A. albidum** Fisch.

+ Perianth segments yellow; leaves semicylindric; filaments slightly exceeding to half as long again as perianth segments . . . . . 40. A. **Stellerianum** Willd.

59. Segments of the subspherical perianth greenish-white, sometimes dingy purple on the back, 4–5 mm long, obtuse; style exserted; filaments half as long again to twice as long as perianth segments; umbel spherical, densely many-flowered; leaves flat, broadly linear, 3–15 mm broad (Centr. Asia). . . . . 60.

+ Perianth segments rose, rosy-violet, dingy violet, yellow, yellowish, or if white then style and filaments not exserted . . . . . 61.

60. Filaments entire, equal; scape leafy up to the middle . . . . . 5. A. **Drobovi** Vved.

+ Inner filaments 2-toothed at base, about twice as broad as the outer ones; scape sheathed by the leaves at base or up to one-third its length. . . . . 6. A. **oreoscordum** Vved.

61. Bulb tunics obscurely reticulate-fibrous or coarsely reticulate-fibrous, or (the outermost) nearly reticulate and then spathe long-beaked; filaments of stamens entire . . . . . 62.

+ Bulb tunics distinctly reticulate, or obscurely reticulate and then inner filaments toothed at base . . . . . 67.

62. Umbel capitate; pedicels half as long as to rarely slightly shorter than perianth, ebracteolate; leaves more or less falcately recurved; a small plant. ca. 10 cm tall . . . . . 46. A. **pumilum** Vved.

122 + Umbel fasciculate or hemispherical; pedicels mostly equaling or half as long again to twice as long as perianth, subtended by bracteoles. . . . . 63.

63. Filaments two-thirds the length of perianth; perianth campanulate. . . . . 64.

+ Filaments slightly exceeding to half as long again as perianth segments; perianth hemispherical . . . . . 65.

64. Inner filaments gradually attenuate from base, 3 times as broad as the outer ones . . . . . 74. A. **teretifolium** Rgl.

+ Filaments strongly subulate from triangular base, the inner ones twice as broad at base as the outer . . . . . 75. A. **Korolkovii** Rgl.

65. Leaves flat, canaliculate, 4–5 mm broad; perianth segments acute. . . . . 73. A. **daghestanicum** Grossh.

+ Leaves 0.5–2 mm broad; perianth segments obtuse or mucronate. . . . . 66.

66. Leaves 0.5–1 mm broad; perianth segments 4–5 mm long; pedicels half as long again to twice as long as perianth . . . . . 77. A. **gunibicum** Miscz.

+ Leaves 1–2 mm broad; perianth segments 5–6 mm long; pedicels equaling to half as long again as perianth . . . 76. A. **Albovianum** Vved.

67. Filaments connate and adnate to perianth at the very base . . . . . 68.

+ Filaments connate and adnate to perianth for 1/4–1/2 their length or merely for 1/5–1/6 their length and then perianth narrowly campanulate, (5)–7–10 mm long . . . . . 83.

68. Scape scabrous; sheaths often villous . . . . . 69.

+ Scape smooth; sheaths glabrous . . . . . 70.

69. Perianth segments yellow, oblong, obtuse, 4–6 mm long . . . . . 21. A. scabriscapum Boiss. et Ky.
+ Perianth segments reddish-violet, oblong-lanceolate, acute or rarely obtuse, commonly 7 mm long . . . . . 22. A. trachyscordum Vved.
70. Perianth segments 2–3 mm long; umbel brittle, few-flowered, loose; pedicels subtended by numerous bracteoles; small plants, ca. 15 cm tall . . . . . 20. A. oreodictyum Vved.
+ Perianth segments (3.5)–4–7 mm long; umbel not brittle, dense or fairly loose; pedicels with few bracteoles . . . . . 71.
71. Perianth segments greenish yellow or nearly white, sometimes suffused with red on the back; filaments yellow . . . . . 72.
+ Flowers rose or rosy-lilac . . . . . 73.
123 72. Leaves flat, with nearly parallel margins; perianth segments greenish-yellow. . . . . 10. A. flavidum Ldb.
+ Leaves semicylindric, canaliculate, fistulous, attenuate toward apex; perianth segments nearly white . . . . . 9. A. leucocephalum Turcz.
73. Leaves semicylindric, (1/2)–1–2 mm broad . . . . . 74.
+ Leaves flat, (1)–2–5 mm broad . . . . . 75.
74. Umbel hemispherical, rather few-flowered, loosish; leaves close to scape base; filaments slightly exceeding the perianth . . . . . 7. A. Fischeri Rgl.
+ Umbel commonly spherical, dense, many-flowered; scape covered up to one-third its length by distant sheathing leaves; filaments half as long again to nearly twice as long as perianth . . 8. A. clathratum Ldb.
75. Filaments slightly shorter than to half as long again as perianth segments, the inner ones toothed at base, the base about as long as broad; perianth segments with a prominent nerve . . . . . 76.
+ Filaments half as long again to twice as long as perianth segments . . . . 79.
76. Perianth segments pale rose with purple nerve; leaves 4–6, very close to scape base, smooth; style strongly exserted . . 19. A. oreoprasoides Vved.
+ Perianth segments rose or rose-purple; leaves 2–4, scabrous-margined; lower one-third of scape covered with distant leaf sheaths or the sheaths more or less approximate at base and then flowers vividly colored . . . . . 77.
77. Style 5–6 mm long, strongly exserted; stigma scarcely thickened; pedicels slightly shorter than to equaling the perianth . . . . . 16. A. amphibolum Ldb.
+ Style 2.5–3.5 mm long, exserted; pedicels equaling or half as long again to twice as long as the perianth. . . . . 78.
78. Perianth segments rose, darker on the back, oblong-lanceolate or oblong-linear; stigma scarcely thickened . . . . 15. A. bogdoicolum Rgl.
+ Perianth segments rose, elliptic to oblong-elliptic; stigma subcapitate. . . . . 14. A. strictum Schrad.
79. Pedicels about half as long as to slightly longer than the perianth; segments commonly pale rose, 5–7 mm long . . . . . 80.
+ Pedicels 1.5–2–3 times the length of perianth; segments rose and 3.5–4–(5) mm long or light rosy-lilac and then not more than 4 mm long . . . . . 81.
124 80. Perianth segments (5)–6–7 mm long, lanceolate to oblong-lanceolate; bulb tunics distinctly reticulate . . . . . 17. A. Szovitsii Rgl.

+ Perianth segments 5 mm long, oblong to ovate; bulb tunics coarsely and obscurely reticulate. . . . . 18. A. brachyodon Boiss.

81. Perianth segments rose, faintly nerved; base of inner stamens longer than broad . . . . . 13. A. lineare L.

+ Perianth segments with a prominent nerve; base of inner stamens as long as or shorter than broad . . . . . 82.

82. Bulbs narrowly cylindric; conical; perianth segments 3.5–4 mm long, light rosy-lilac . . . . . 12. A. splendens Willd.

+ Bulbs ovoid-oblong; perianth segments 4–5 mm long, rose . . . . . 11. A. Maackii Prokh.

83. Leaves and their sheaths (especially the lower ones) hairy; small plants, 5–15 cm tall . . . . . 23. A. guzaricum Rgl.

+ Plants glabrous, usually more robust . . . . . 84.

84. Perianth substellate or hemispherical; leaves approximate at scape base. . . . . 85.

+ Perianth campanulate or narrowly campanulate; leaves more or less distant . . . . . 86.

85. Inner filaments twice as broad at base as the outer ones; bulb tunics strongly reticulate . . . . . 35. A. oreoprasum Schrenk.

+ Filaments subequal; bulb tunics thin and rather obscurely reticulate. . . . . 36. A. odorum L.

86. Ovary topped by a crest surrounding the style . . . . . 87.

+ Ovary not crested at the top . . . . . 88.

87. Perianth segments dingy violet, unequal, the outer linear-lanceolate to lanceolate, one-fourth as long again as the lanceolate to oblong-lanceolate inner segments; pedicels unequal, half as long as to slightly exceeding (in fruit twice the length of) the perianth . . . . . 33. A. stenophanophorum Vved.

+ Perianth segments dark reddish-rose, subequal, the outer oblong, the inner lanceolate; pedicels subequal, half the length of perianth segments . . . . . 34. A. tenuicaule Rgl.

125 88. Filaments equaling to slightly exceeding the perianth segments; style (especially in fruit) exserted . . . . . 89.

+ Filaments one-half to two-thirds the length of perianth; style not exserted even in fruit . . . . . 90.

89. Umbels hemispherical to subspherical, rarely fasciculate-hemispherical; pedicels equaling or half as long again (to twice as long) as perianth; anthers yellow . . . . . 31. A. dolichostylum Vved.

+ Umbel fasciculate or fasciculate-hemispherical, rarely hemispherical; pedicels half as long as to equaling ot (in fruit) half as long again as perianth segments; anthers violet . . . . . 32. A. inderiense Fisch.

90. Perianth segments yellowish . . . . . 28. A. lutescens Vved.

+ Perianth segments dingy violet, rose-violet or violet, without any yellow tinge. . . . . 91.

91. Perianth segments dingy violet or brownish-violet, darker on the back. . . . . 92.

+ Perianth segments pale rose, rose, light violet or violet, with darker nerve . . . . . 93.

92. Leaves 2 or 3, narrowly linear, often subfiliform, 0.5–1 mm broad, canaliculate. . . . . 24. A. inconspicuum Vved.

+ Leaves 4 or 5, linear, 2.5–10 mm broad, flat, falcately recurved. . . . . 25. A. drepanophyllum Vved.

93. Umbel spherical or hemispherical, very rarely fasciculate-hemispherical, loose; pedicels ascending, 4–6 times as long as perianth or merely (2)–3–4 times as long as then perianth 5–7 mm long . . . . . 94.

+ Umbel fasciculate or hemispherical, dense; pedicels half as long as to equaling or rarely 2–3 times the length of perianth; perianth segments 7–14 mm long . . . . . 95.

94. Leaves canaliculate, fistulous, 1–3 mm broad; perianth segments purplish-violet, 7–9 mm long; pedicels 4–6 times as long as perianth. . . . . 29. A. longiradiatum Vved.

+ Leaves flat, not fistulous, falcately recurved, (1)–3–4 mm broad; perianth segments commonly pale violet, 5–7 mm long; pedicels (2)–3–4 times as long as perianth . . . . 30. A. dolichomischum Vved.

95. Leaves flat, 3–5–(10) mm broad, falcately recurved; anthers commonly violet . . . . . 26. A. xiphopetalum Aitch. et Baker.

126 + leaves canaliculate, 1–3 mm broad; anthers yellow . . . . . 27. A. Barsczewskii Lipsky .

96. Inner filaments 3-parted at 1/3 to 4/5 of the length, with filiform lateral cusps, these in most species exceeding, in fewer shorter than, the antheriferous central cusp; aerial portion of scape covered to high up with sheathing leaves (Section Porrum). . . . . 97.

+ Filaments undivided or the inner ones bicuspidate; cusps never exceeding the anther, short, or if fairly long and then borne at base of filaments. . . . . 130.

97. Small, usually squat plants, 10–30 cm tall; leaves exceeding the umbel. (Central. Asia) . . . . . 98.

+ Larger, slender plants, 30–70 (100) cm tall, rarely (usually depressed specimens) 15–30 cm tall; leaves much shorter than scape. . . . . 101.

98. Outer bulb tunics papery or subcoriaceous, nerveless; bulblets none or nearly smooth . . . . . 99.

+ Outer bulb tunics reticulate or reticulately nerved; bulblets reticulately nerved . . . . . 100.

99. Central cusp of inner stamens one-third the length of undivided part, half as long again to twice as long as the lateral cusps; bulblets none; perianth segments 6–7 mm long . . . 144. A. Lehmannianum Merckl.

+ Central cusp of inner stamens two-thirds as long to as long as undivided part, slightly exceeding to half as long again as the lateral cusps; bulblets dull, yellow, keeled on the back; perianth segments 4–(6) mm long . . . . . 143. A. ferganicum Vved.

100. Central cusp of inner stamens one-fourth to one-third the length of undivided part; scapes commonly 2–(5) mm from one bulb . . . . . 145. A. Borszczowii Rgl.

+ Central cusp of inner stamens half as long again to twice as long as undivided part; scape solitary . . . . . 146. A. brevidens Vved.

101. Outer bulb tunics reticulate or reticulately nerved; bulblets, when present, always yellowish, large . . . . . 102.

+ Outer bulb tunics papery or coriaceous, splitting or at the top sometimes fibrous with obscure reticulation; bulblets, when present, blackish-brown or blackish-violet, or if yellow then small . . . . . 107.

102. Bulblets reticulately nerved, densely beset with crystalline tubercles. . . . . 148. A. crystallinum Vved.

\+ Bulblets, when present, smooth or reticulately nerved, always devoid of crystalline tubercles . . . . . 103.

103. Bulb tunics reticulate or reticulately nerved, sheathing the scape base a short distance up; bulblets always smooth (Centr. Asia) . . . . . 104.

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\+ Bulb tunics numerous, profusely reticulate, sheathing the scape to high up; bulblets none, or bulb solitary with reticulate nervature. . . . . 105.

104. Perianth segments rose-violet, 5–6 mm long, linear-lanceolate, acute; central cusp of inner stamens equaling the undividual part and the lateral cusps. . . . . 147. A. turcomanicum Rgl.

\+ Perianth segments greenish (often rosy in herbarium), 4–5 mm long, oblong to oblong-ovate; central cusp of inner stamens half as long as the undivided part and two-sevenths to two-thirds the length of lateral cusps . . . . . 149. A. filidens Rgl.

105. Leaves not fistulous, linear, canaliculate, approximate at scape base; perianth segments whitish, canaliculate, 5–6 mm long; style not exserted . . . . . 150. A. dictyoscordum Vved.

\+ Leaves fistulous, attenuate toward apex; perianth segments 3–5 mm long, dull green, white-margined, dark purple or brownish-green, smooth . . . . . 106.

106. Leaves 6–11 mm broad; perianth segments dull green, white-margined; filaments naked, rarely sparsely ciliate . . . . . 151. A. viride Grossh.

\+ Leaves 3–5 mm broad; perianth segments dark purple or brownish-green; filaments slightly ciliate . . . . 152. A. dictyoprasum C.A.M.

107. Segments of the tubular-campanulate perianth 7–9 mm long. . . . . 154. A. Aucheri Boiss.

\+ Perianth segments 4–5 mm long . . . . . 108.

108. Leaves fistulous; style exserted . . . . . 109.

\+ Leaves not fistulous, linear, canaliculate. . . . . 115.

109. Umbel commonly bearing bulblets . . . . . 153. A. vineale L.

\+ Umbel without bulblets . . . . . 110.

110. Perianth narrowly campanulate, whitish or with a small spot on the segments; inner filaments broader at base then perianth segments. . . . . 111.

\+ Perianth oblong-ovoid or ovoid, commonly wine-red or purple; inner filaments as broad at base as perianth segments . . . . . 112.

111. Perianth 4 mm long, whitish, the segments not spotted; filaments ciliate . . . . . 156. A. affine Ldb.

\+ Perianth 2.5 mm long whitish, the segments with a small spot; filaments naked . . . . . 155. A. guttatum Stev.

112. Bulb tunics coriaceous, indurated; bulblets yellowish-brown, minutely tuberculate; leaves cylindric; perianth 3.5 mm long, wine-

128 red, the outer segments scabrous-keeled . . . . . 157. A. firmotunicatum Fom.

\+ Bulb tunics papery or coriaceous; bulblets yellowish, smooth, or yellowish-brown or brown and made dull by the prominent nerves and then leaves semicylindric, canaliculate; perianth ca. 4 mm long, rose or often dark purple, very rarely whitish . . . . . 113.

113. Bulblets numerous, yellowish-brown or often brown; central cusp of inner stamens one-third to one-half the length of undivided part; pedicels smooth . . . . . 160. **A. Regelianum** Beck.

\+ Bulblets few, yellowish; central cusp of inner stamens one-half to two-thirds the length of undivided part; pedicels scabrous below flower . . . . . 114.

114. Perianth segments scabrous; leaves commonly smooth; bracteoles few . . . . . 159. **A. sphaerocephalum** L.

\+ Perianth segments smooth; leaves commonly scabrous; bracteoles numerous . . . . . 158. **A. fuscoviolaceum** Fom,

115. Umbel with bulblets . . . . . 116.

\+ Umbel without bulblets . . . . . 118.

116. Perianth segments 5 mm long, scabrous; leaves barely reaching beyond the middle of scape. . . . . 161. **A. scorodoprasum** L.

\+ Perianth segments 3 mm long, smooth; leaves reaching well beyond the middle of scape . . . . . 117.

117. Filaments after anthesis half as long again as perianth segments; a wild-growing plant . . . . . 162. **A. longicuspis** Rgl.

\+ Filaments shorter than perianth segments; a cultivated plant. . . . . 163. **A. sativum** L.

118. Bulblets and tunics of replacement bulb blackish-brown, blackish-violet or brownish-purple . . . . . 119.

\+ Bulblets and tunics of replacement bulb yellowish . . . . . 125.

119. Perianth spherical-campanulate; filaments equaling or rarely slightly shorter than perianth segments; capsule equaling the perianth . . . 120.

\+ Perianth campanulate, ovoid-campanulate or ovoid-pyramidal; filaments two-thirds to three-quarters the length of perianth segments. . . . . 122.

120. Perianth segments light rose . . . 166. **A. gracilescens** Somn. et Lev.

\+ Perianth segments whitish sometimes with purplish back, or dark purple . . . . . 121.

121. Perianth segments whitish, sometimes with purplish back . . . . . 164. **A. Fominianum** Miscz.

129 \+ Perianth segments dark purple . . . . . 165. **A. ponticum** Miscz.

122. Segments of the campanulate perianth lanceolate, acute, rose. . . . . 167. **A. erubescens** C. Koch.

\+ Perianth segments broader, oblong, ovoid or elliptic, at least the inner ones obtuse or obtusish . . . . . 123.

123. Segments of the broadly campanulate perianth obtuse, the outer dark purple, the elliptic inner ones commonly nearly white with a purple nerve . . . . . 168. **A. rotundum** L.

\+ Segments of the ovoid-campanulate or ovoid-pyramidal perianth similarly colored, the inner ones oblong-ovoid . . . . . 123.

124. Perianth segments rose-violet; umbel mostly capitate . . . . . 169. **A. jajlae** Vved.

\+ Perianth segments dark purplish-violet. . . . . 170. **A. Waldsteinii** Don.

125. Scape 15–30 cm long; filaments slightly shorter than perianth segments; perianth segments nearly white, 5 mm long, acute strongly scabrous; style included . . . . . 171. **A. talyschense** Miscz.

+ Scape 50–120 cm long; filaments barely exceeding or up to twice as long as perianth segments; style exserted . . . . . 126.

126. Filaments one-fourth as long again to twice as long as perianth segments; perianth segments 3–4 mm long . . . . . 127.

+ Filaments barely exceeding the perianth; perianth segments 5 mm long . . . . . 129.

127. Central cusp of inner stamens as long as the undivided part and barely exceeding the lateral cusps; perianth segments lanceolate or oblong-lanceolate, acute, rosy . . . . . 172. A. **pseudoampeloprasum** Miscz.

+ Central cusp one-half to two-thirds the length of the undivided part and of the lateral cusps; perianth segments elliptic, oblong-ovate or ovate, obtuse or acutish, white, dingy green or dark purplish-violet. . . . . 128.

128. Perianth segments white . . . . . 174. A. **leucanthum** C. Koch.

+ Perianth segments dark purplish-violet, rarely dingy green . . . . . 173. A. **atroviolaceum** Boiss.

129. A perennial wild-growing plant; scape arising laterally from the bulb. . . . . 175. A. **ampeloprasum** L.

+ A biennial cultivated plant; scape arising from the center of the bulb. . . . . 176. A. **porrum** L.

130. Aerial part of scape clothed to high up by leaf sheaths; leaves filiform, semicylindric, cylindric, or rarely flat, fistulous or not fistulous (Section Haplostemon) . . . . . 131.

+ Underground part of scape clothed with leaf sheaths or more rarely the aerial part more or less sheathed and then leaves lorate; leaves sometimes not fistulous, linear, linear-lanceolate, lorate, or oblong to elliptic . . . . . 179.

131. Umbel fasciculate or fasciculately hemispherical, apparently 2-whorled owing to nodding or pendulous flowers and erect fruiting pedicels; spathe splitting into 2 long-acuminate valves, the longer valve usually greatly exceeding the umbel (c.f. A. karsianum), the beak equaling or sometimes several times as long as the blade; bulb tunics papery or subcoriaceous, never reticulate or reticulately fibrous . . . . . 132.

+ Umbel fasciculate, hemispherical, sometimes subcapitate; flowers neither nodding nor pendulous, and if nodding then bulb tunics reticulate or reticulately fibrous; spathe deciduous by circumcission short- or long-beaked, or splitting and short-beaked, or sometimes the beak to 3 times the length of the body (c.f. A. delicatulum). . . . . 143.

132. Flowers pearly white; capsule slightly longer than perianth . . . . . 110. A. **convallarioides** Grossh.

+ Flowers colored; capsule slightly shorter than or about equaling the perianth . . . . . 133.

133. Perianth segments dull by readily rubbed-off bloom; filaments half as long again to twice the length of perianth; ovary oblong, short-stipitate . . . . . 134.

+ Perianth segments without bloom, lustrous or not so . . . . . 135.

134. Flowers yellowish, more or less intensely rose-tinged, dingy; umbel without bulblets . . . . . 102. A. pulchellum Don.
+ Flowers rose; umbel with bulblets . . . . . 103. A. carinatum L.
135. Perianth segments 3–4 mm long; filaments one-fourth or one-half (twice) as long again as perianth segments . . . . . 136.
+ Perianth segments 5–8 mm long; filaments slightly shorter than to slightly exceeding the perianth segments . . . . . 138.
136. Perianth segments whitish-green with a small violet spot . . . . . 100. A. kossoricum Fom.
+ Perianth segments yellow or rose . . . . . 137.
137. Perianth segments yellow, rarely rose-tinged; outer bulb tunics subcoriaceous, distinctly parallel-nerved; tunics of replacement
131 bulb distinctly parallel-nerved . . . . . 101. A. pseudoflavum Vved.
+ Perianth segments rose, without any trace of yellow; outer bulb tunics papery, essentially nerveless; tunics of replacement bulb without distinct nerves . . . . . 99. A. stamineum Boiss.
138. Umbel bearing bulblets . . . . . 104. A. oleraceum L.
+ Umbel without bulblets . . . . . 139.
139. Pedicels subequal, slightly shorter than or 2–(3) times as long as perianth segments . . . . . 140.
+ Pedicels very unequal, the longest at least 3 times the length of the shortest, (1)–2–9 times as long as the perianth . . . . . 141.
140. Perianth segments pale rose to nearly white, with a purple nerve, not lustrous, 5–6 mm long; filaments equaling to barely exceeding the perianth. . . . . 109. A. rupestre Stev.
+ Perianth segments rose or often dark rose, with a purple nerve, lustrous, (6)–7–8 mm long; filaments slightly to one-fourth shorter than perianth segments . . . . . 108. A. Kunthianum Vved.
141. Perianth segments pale rose to nearly white, obtuse, round-tipped, (6)–7–8 mm long.. . . . . 107. A. karsianum Fom.
+ Perianth segments rose, sometimes dark rose or dingy rose, obtuse, truncate or subtruncate, 5–6 mm long . . . . . 142.
142. Perianth segments lustrous, bright or dark rose, at least in anthesis. . . . . 105. A. paniculatum L.
+ Perianth segments inconspicuous even in anthesis, dingy rose, dull. . . . . 106. A. lenkoranicum Miscz.
143. Outer bulb tunics reticulate, reticulately fibrous or reticulately-nerved, or coriaceous and obscurely reticulate-nerved, or subchartaceous and parallel-nerved, but in any case prominently and densely nerved and bulblets distinctly nerved . . . . . 144.
+ Outer bulb tunics papery or coriaceous, without distinct nerves, or the nerves distantly parallel and then bulblets pitted; bulblets, when present, always nerveless . . . . . 159.
144. Filaments connate and adnate to perianth at base . . . . . 145.
+ Filaments connate and adnate to perianth for one-third to one-half the length, and if only for one-fourth the length then spathe tearing off all round, caducous . . . . . 150.
132
145. Leaves cylindric, fistulous, spirally to subcircinately coiled; bulblets few . . . . . 122. A. ophiophyllum Vved.
+ Leaves filiform, canaliculate, never spirally coiled; bulblets none. . . . . 146.

146. Inner perianth segments deeply dissected in upper part, the outer ones entire . . . . . 98. A. lacerum Freyn.
+ All perianth segments entire . . . . . 147.
147. Bulb tunics reticulate; lower sheaths hairy. . . . . 97. A. callidictyum C.A.M.
+ Bulb tunics coriaceous, splitting or (in some) more or less reticulate-fibrous; sheaths glabrous, smooth . . . . . 148.
148. Base of spathe forming a tube enveloping the base of umbel; ovary subglobose; bulb tunics coriaceous, splitting, with reticulate nervature . . . . . 94. A. Margaritae B. Fedtsch.
+ Base of spathe torn; ovary truncately conical or pyriform; tunics subcoriaceous, splitting, more or less reticulately fibrous . . . . . 149.
149. Pedicels very unequal, (2)-3-6-(10) times as long as perianth; perianth segments 4-5-(7) mm long; leaves wilting before anthesis. . . . . 95. A. inaequale Janka.
+ Pedicels subequal, equaling to 2 (3) times as long as perianth; perianth segments (5)-6-7 mm long; leaves persistent nearly to anthesis . . . . . 96. A. moschatum L.
150. Perianth segments light carneous, the inner gibbous at base, half as long again as the outer . . . . . 121. A. Griffithanum Boiss.
+ Perianth segments white, rose or dark rose, the inner not gibbous; perianth umbilicate at base (A. rubellum s.l.) . . . . . 151.
151. Spathe deciduous by circumscission. . . . . 152.
+ Spathe splitting down to base, persistent . . . . . 157.
152. Segments of the broadly campanulate perianth 3-5-(6) mm long; filaments slightly exceeding to half as long again as perianth segments; capsule slightly shorter than perianth . . . . . 153.
+ Segments of the campanulate or narrowly campanulate perianth (4)-5-7 mm long; filaments one-third to two-thirds the length of perianth segments; capsule one-half to two-thirds as long as perianth. . . . . 155.
153. Outer bulb tunics coriaceous, often reticulately fibrous; bulblets reticulately nerved; beak of spathe usually exceeding the blade;
133 perianth segments 4-5-(6) mm long . . . . . 122. A. fibrosum Rgl.
+ Outer bulb tunics coriaceous, subreticulately nerved; bulblets commonly winged, slenderly nerved; perianth segments 3-4-(5) mm long . . . . . 154.
154. Perianth segments dark rose, linear-oblong, obtuse . . . . . 113. A. syntamanthum C. Koch.
+ Perianth segments rose, oblong to oblong-lanceolate, tapering, acute to obtusish . . . . . 114. A. rubellum MB. s.s.
155. Outer tunics grayish, subchartaceous, the nerves nearly parallel; bulblets whitish, slenderly nerved . . . 117. A. Jacquemontii Kunth.
+ Outer tunics brown, coriaceous, subreticulately nerved or sometimes fibrous; bulblets yellowish or brownish . . . . . 156.
156. Bulblets rather few, with slender nerves; inner filaments as broad at base as perianth segments . . . . . 115. A. albanum Grossh.
+ Bulblets commonly numerous, with thick reticulate nervature, distinctly alveolate between the nerves; inner filaments slightly broader at base than perianth segments . . . . . 116. A. scabrellum Boiss. et Buhse.

157. Perianth segments rose, the outer one-fourth to one-half as long again as the inner. . . . . 118. A. anisotepalum Vved.

\+ Perianth segments white, equal or the outer slightly longer than the inner . . . . . 158.

158. Segments of the broadly campanulate perianth oblong or rarely oblong-lanceolate, commonly short-acuminate, the outer usually slightly longer than the inner . . . . . 119. A. minutum Vved.

\+ Segments of the campanulate perianth oblong-lanceolate or lanceolate, strongly tapering, equal . . . . . 120. A. parvulum Vved.

159. Perianth purple, 8–10 mm long; leaf solitary; plants scabrous throughout. . . . . 135. A. kujukense Vved.

\+ Perianth 3–7 mm long; leaves 2–4; plants (at least the scape) smooth or, if even scape scabrous, then inner filaments 2-toothed . . . . . 160.

160. Outer bulb tunics coriaceous, pitted, or with crested projections, or
134 furrowed by concave distant nerves, or sometimes smooth, but bulblets always tuberculate-pitted . . . . . 161.

\+ Outer bulb tunics papery, smooth; bulblets none or smooth . . . . . 166.

161. Inner filaments 3-angled, 3 times as broad at base as the outer; perianth segments (5)–6–7 mm long . . . .136. A. eremoprasum Vved.

\+ Filaments subulate, equal; perianth segments ca. 3 mm long . . . 162.

162. Outer perianth segments scabrous . . . . . 163.

\+ Perianth segments smooth . . . . . 164.

163. Perianth segments greenish, obtuse; bulb tunics furrowed by concave distant nerves; scape stout, appearing slantingly inflated . . . . . 141. A. sabulosum Stev.

\+ Perianth segments brownish, violet-tinged in herbarium, acute; scape slender . . . . . 138. A. confragosum Vved.

164. Outer bulb tunics without crested projections, pitted, blackish or brownish; squat plants with usually stoutish scape 10–20 cm long. . . . . 139. A. scrobiculatum Vved.

\+ Outer bulb tunics, at least in young (nonfruiting) specimens, with longitudinal crests, light brown; scape (15) 20–60 cm long, slender. . . . . 165.

165. Perianth segments light lilac, obtuse . . .140. A. transvestiens Vved.

\+ Perianth segments whitish, with a dingy purple nerve, acute . . . . . 137. A. Popovii Vved.

166. Inner filaments 2–3 times as broad as base as the outer . . . . . 167.

\+ Filaments at base equal or the inner half as broad again as the outer, commonly not toothed . . . . . 174.

167. Perianth segments ca. 3 mm long, obtuse, rose, not lustrous; leaves flat from base, attenuate toward apex, 2–10 mm broad; robust plants, (40)–70–100 cm tall, with bulb 1.5–3 cm thick. . . . . 142. A. turkestanicum Rgl.

\+ Perianth segments 4–8 mm long; scape not more than 40 cm long, and if longer then flowers azure to bluish-azure . . . . . 168.

168. Upper sheaths inflated at summit; flowers lustrous, rose, in a dense and sometimes subcapitate umbel; pedicels half as long as to equaling or (in fruit) up to half as long again as perianth; inner filaments 2-toothed . . . . . 134. A. schoenoprasoides Rgl.

+ Sheaths not inflated; pedicels at least twice the length of perianth segments, or if as long as or half as long again then filaments toothless. . . . . 169.

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169. Perianth segments azure or bluish-azure or bluish-violet or white turning light violet in herbarium . . . . . 170.

+ Perianth segments rose with a purple nerve, small plants, not exceeding 20 cm in height . . . . . 172.

170. Perianth segments white, turning light violet in herbarium, 5–6 mm long; slender plants, 10–20 cm tall; umbel loose; outer pedicels ascending . . . . . 131. **A. elegans** Drob.

+ Perianth segments azure, bluish-azure or bluish-violet; larger plants, (15)–30–80 cm tall; umbel dense . . . . . 171.

171. Leaves semicylindric, canaliculate; perianth campanulate; inner filaments with 2 teeth at two-thirds the length . . . . . 130. **A. caesium** Schrenk.

+ Leaves 3-angled, canaliculate; perianth broadly campanulate; inner filaments toothless or 2-toothed below the middle . . . . . 129. **A. coeruleum** Pall.

172. Perianth segments 4–5 mm long; inner filaments 2-toothed. . . . . 133. **A. oreophiloides** Rgl.

+ Perianth segments 6–7 mm long; filaments toothless . . . . . 173.

173. Pedicels 2–3 times as long as perianth; bracteolate at base; spathe deciduous . . . . . 123. **A. inops** Vved.

+ Pedicels 3–5 times as long as perianth; spathe persistent. . . . . 132. **A. kopetdagense** Vved.

174. Pedicels 3–5 times as long as perianth; umbel few-flowered, loose; filaments two-thirds as long as to slightly shorter than perianth; spathe very short-acuminate; umbel several times as long as spathe. . . . . 111. **A. kirindicum** Bornm.

+ Pedicels slightly shorter than or half as long again to twice as long as perianth, or if 4 times the length of perianth then umbel densely capitate and/or filaments exceeding the perianth or spathe long-beaked. . . . . 175.

175. Filaments to half as long again as perianth segments, or equaling them and then spathe short-acuminate . . . . . 176.

+ Filaments three-fourth as long as or equaling the perianth segments; spathe long-beaked, the beak at least as long as the blade . . . . . 177.

176. Perianth segments rose, lustrous, 3–4 mm long, lanceolate to oblong-lanceolate; umbel always without bulblets. . . . . 127. **A. Pallasii** Murr.

+ Perianth segments dark rose, (4)–5 mm long, relatively dull, oblong to oblong-lanceolate; umbel commonly with bulblets, rarely without them . . . . . 128. **A. macrostemum** Bge.

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177. Sheaths densely covered with short hairs; perianth segments 6–7 mm long; style not exserted . . . . . 124. **A. lasiophyllum** Vved.

+ Sheaths glabrous, smooth or rarely scabrous; style scarcely exserted. . . . . 178.

178. Pedicels commonly 2–3 times the length of perianth; perianth segments whitish or rosy. . . . . 125. **A. delicatulum** Sievers.

+ Pedicels slightly shorter than to equaling the perianth; perianth segments rose-violet . . . . . 116. A. glomeratum Prokh.

179. Pedicels subtended by large bracteoles; filaments adnate to perianth for one-half their length (Section Calloscordum) . . . . . 226. A. nerinifolium Baker.

+ Pedicels ebracteolate (Section Molium) . . . . . 180.

180. Perianth segments soon recurved, withering after anthesis, more or less twisted . . . . . 181.

+ Perianth segments generally not withering after flowering, commonly erect . . . . . 207.

181. Ovary containing 7–10 ovules; umbel loose; pedicels 3 or many times the length of perianth; perianth segments 4–5 mm long; small plants; scape 10–20 cm long . . . . . 182.

+ Ovary containing numerous ovules . . . . . 186.

182. Leaves divided down to base into filiform lobes, forming a false whorl . . . . . 185. A. verticillatum Rgl.

+ Leaves entire . . . . . 183.

183. Spathe with a long herbaceous beak; bulb tunics coriaceous . . . . . 186. A. aroides Vved.

+ Spathe short-acuminate; bulb tunics papery . . . . . 184.

184. Scape stout, 5–8 mm thick; pedicels stout, clavately thickened below the flower; perianth segments 5 mm long . . . . . 182. A. helicophyllum Vved.

+ Scape slender, ca. $1\frac{1}{2}$ mm thick; pedicels slender, not thickened below the flower; perianth segments 4 mm long . . . . . 185.

185. Leaves erect; the underside of leaves in lower part and the upper part of sheaths hairy. . . . . 184. A. Eugenii Vved.

+ Leaves crowded, glabrous . . . . . 183. A. Sergii Vved.

186. Squat plants, 10–25 cm tall; scape stout, buried in the soil up to the middle or higher up; leaves greatly exceeding the umbel. . . . . 187.

+ Usually taller plants; scape buried at base; leaves shorter than scape. . . . . 188.

187. Leaves linear-lanceolate to narrowly lanceolate, 1–2 cm broad . . . . . 194. A. brachyscapum Vved.

+ Leaves lanceolate or often oblong to subelliptic, (3)–5–13 cm broad. . . . . 195. A. karataviense Rgl.

188. Ovary 6-corniculate; filaments distinctly connate in a ring above the part adnate to perianth . . . . . 189.

+ Ovary not corniculate . . . . . 190.

189. Perianth segments gradually attenuate from base toward apex, dark rosy-violet; umbel rather loose . . . . . 214. A. seravschanicum Rgl.

+ Perianth segments attenuate from the middle toward apex, light-rosy-violet; umbel more compact, dense . . . . . 215. A. pseudoseravschanicum M. Pop. et Vved.

190. Perianth segments white, with green nerve, 11 mm long, filiform-linear, gradually attenuate from base toward apex; robust plants, 90–150 cm tall . . . . . 208. A. gultschense B. Fedtsch.

+ Perianth segments rose, rosy-violet, violet or wine-red, or if white then segments 4 mm long . . . . . 191.

191. Perianth segments rosy-violet, delicate, obscurely nerved, 5–7 mm long; inner filaments commonly toothed at base . . . . . 198. A. Fetissovii Rgl.

\+ Perianth segments with a distinct nerve . . . . . 192.

192. Leaves and sometimes scape pubescent . . . . . 193.

\+ Plants glabrous . . . . . 195.

193. Robust plants, 60–150 cm tall; perianth segments lilac, 9 mm long. . . . . 207. A. stipitatum Rgl.

\+ Perianth segments 4–6 mm long; scape 15–70 cm long . . . . . 194.

194. Perianth segments 6 mm long, light violet; plants vested with long hairs . . . . . 206. A. alaicum Vved.

\+ Perianth segments 4 mm long, white; plants vested with short hairs, rough . . . . . 199. A. dasyphyllum Vved.

195. Perianth segments 3–5 mm long . . . . . 196.

\+ Perianth segments 6–12 mm long . . . . . 202.

196. Perianth segments dark purple or wine-red . . . . . 197.

\+ Perianth segments pale rose or rosy-violet . . . . . 199.

197. Perianth segments 5 mm long, dark purple . . . . . .201. A. robustus Kar. et Kir.

\+ Perianth segments 3–4 mm long, wine-red . . . . . 198.

198. Filaments barely shorter than perianth segments, the inner ones obtusely toothed above the middle . . . . . 197. A. cardiostemon Fisch. et Mey.

\+ Filaments entire, slightly longer than perianth segments . . . . . 196. A. Mariae Bord

199. Filaments subequal at base . . . . . 200.

\+ Inner filaments twice as broad at base as the outer . . . . . 201.

200. Small plants, 20–30 cm tall; leaves 1–2 mm broad . . . . . 200. A. insufficiens Vved.

\+ Fairly robust plants, 35–85 cm tall; leaves 5–20 mm broad . . . . . 204. A. Suvorovii Rgl.

201. Perianth segments linear. . . . . 203. A. Severtzovii Rgl.

\+ Perianth segments narrowly elliptic . . . . . 202. A. decipiens Fisch.

202. Leaves broadly lanceolate to oblong, 4–8 cm broad; scape 30–50 cm long; perianth segments 6 mm long . . . . 213. A. Komarovii Lipsky.

\+ Leaves linear-lanceolate or lorate; more robust plants, 70–150 cm tall or relatively small plants (20–40 cm tall) and then perianth segments 8–12 mm long . . . . . 203.

203. Perianth segment whitish-rose . . . . . 205. A. grande Lipsky.

\+ Perianth segments light or dark violet . . . . . 204.

204. Scape 20–70 cm tall, ribbed by very prominent nerves . . . . . 205.

\+ Scape 80–150 cm long, with not very prominent nerves. . . . . 206.

205. Perianth segments dark violet, gradually attenuate from base toward apex, acute . . . . . 212. A. Rosenbachianum Rgl.

\+ Perianth segments dark rosy-violet, with nearly parallel margins, obtuse . . . . . 211. A. taeniopetalum M. Pop. et Vved.

206. Scape covered with leaf sheaths above ground level; leaves 6–8, glaucous; anthers violet; filaments distinct above the part adnate to perianth . . . . . 209. A. aflatunense B. Fedtsch.

+ Scape not covered with leaf sheaths above ground level; leaves 4–6, more or less green; anthers yellow; filaments more or less connate above the part adnate to perianth. . . . . 210. A. altissimum Rgl

207. Perianth segments rigid after anthesis due to thickening of the nerve, sometimes nearly spinous . . . . . 208.

+ Nerve of perianth segments not thickening after anthesis; perianth segments not spinous . . . . . 214.

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208. Scape buried in the soil up to the middle or nearly up to the umbel; leaves 1–3 . . . . . 209.

+ Scape buried in the soil at base; leaves 2–7 . . . . . 212.

209. Perianth segments 5–6 mm long; scape buried in soil nearly up to the umbel; leaf solitary . . . . . 187. A. monophyllum Vved.

+ Perianth segments 7–13 mm long; scape buried in soil up to the middle; leaves (1) 2 or 3 . . . . . 210.

210. Leaves linear-lanceolate, 0.5–1 cm broad; perianth segments white with a violet nerve; filaments one-half to two-thirds the length of perianth segments . . . . . 188. A. Derderianum Rgl.

+ Leaves linear to elliptic, 2–6 mm broad; perianth segments rose with a dark nerve; filaments half as long as or slightly shorter than perianth segments . . . . . 211.

211. Filaments two-thirds as long as to slightly shorter than perianth segments. . . . . 189. A. Alexejanum Rgl.

+ Filaments half the length of perianth segments . . . . . 190. A. akaka Gmel.

212. Perianth segments 5–9 mm long, lilac with a reddish nerve; leaves glabrous . . . . . 191. A. materculae Bordz.

+ Perianth segments 10–18 mm long, rosy-violet or purplish-violet. . . . . 213.

213. Leaves 1–2–(4), linear-lanceolate, recurved, hispid, glabrous or scabrous beneath; scape relatively slender, not more than 4–(5) mm thick . . . . . 193. A. Bodeanum Rgl.

+ Leaves 3–7, sublorate, strict, the lower surface and margin beset with stiff spreading hairs, rarely glabrous; scape stout, 5–15 mm thick . . . . . 192. A. Christophii Trautv.

214. Pedicels, especially in fruit, clavately thickened below the flower, usually very unequal, thus apparently forming two whorls; umbel very loose, containing fertile and sterile flowers . . . . . 219. A. Schubertii Zucc.

+ Pedicels never clavately thickened below the flower . . . . . 215.

215. Ovary 6-ovuled . . . . . 216.

+ Ovary many-ovuled . . . . . 220.

216. Umbel 1–2–(3)-flowered; perianth segments rose, 4–5 mm long. . . . . 177. A. monanthum Maxim.

+ Umbel containing a larger number of flowers; perianth segments 8–12 mm long . . . . . 217.

217. Flowers white, sometimes rose-tinged; leaves shorter to slightly longer than scape; scape base buried in soil; umbel sometimes bearing bulblets . . . . . 218.

+ Flowers rosy-purple or dingy purple; leaves greatly exceeding the umbel; scape buried in the soil to one-half to three-quarters the length. . . . . 219.

140 218. Scape triquetrous; leaf solitary, 0.5–2.5 cm broad . . . . . 178. A. paradoxum (MB.) Don.
+ Scape terete, leaves 2 or 3, 3–7 mm broad . . . . . 179. A. Candolleanum Albov.
219. Segments of the broadly campanulate perianth a beautiful rose-purple, oval . . . . . 180. A. oreophilum C.A.M.
+ Segments of the campanulate perianth dingy purple, more intensely colored at the tips, oblong-linear to oblanceolate . . . . . 181. A. gypsaceum M. Pop. et Vved.
220. Filaments two-fifths to one half the length of perianth segments, connate and adnate to perianth for one-half to two-thirds their length and often joined together for one-half of their distinct portion; perianth narrowly campanulate . . . . . 221.
+ Filaments slightly shorter than or half as long again to twice as long as perianth segments, connate and adnate to perianth at base; perianth stellate or campanulate . . . . . 225.
221. Perianth segment not withering after anthesis, erect . . . . . 225. A. iliense Rgl.
+ Perianth segments withering after anthesis . . . . . 222.
222. Filaments connate for half their length above the part adnate to perianth . . . . . 223.
+ Filaments nearly distinct above the part adnate to perianth; umbel dense . . . . . 224.
223. Umbels 2 or 3 (4) on one scape, one above the other, or rarely umbel solitary . . . . . 224. A. Regelii Tratuv.
+ Umbel always solitary . . . . . 223. A. cupuliferum Rgl.
224. Flowers rose-violet . . . . . 223. A. Winklerianum Rgl.
+ Flowers white . . . . . 221. A. darvazicum Rgl.
225. Perianth campanulate; squat plants with scape 10–30 cm long. . . . . 220. A. caspium (Pall.) M.B.
+ Perianth stellate; scape 50–150 cm long . . . . . 226.
226. Pedicels immersed at base in the thickened spongy scape apex; perianth segments subcoriaceous after anthesis; filaments slightly shorter than perianth segments . . . . 218. A. Trautvetterianum Rgl.
+ Filaments slightly exceeding to half as long again as perianth segments; perianth segments slender after anthesis; pedicels not immersed at base. . . . . 227.
227. Perianth segments elliptic, 5 mm long, obtuse; filaments about half as long again as perianth segments . . . . . 217. A. giganteum Rgl.
141 + Perianth segments linear-lanceolate, 6–8 mm long; filaments slightly exceeding the perianth segments . . . . . 216. A. elatum Rgl.

Section 1. **ANGUINUM** Don. Mon. (1826) 96. — Bulb attached to rhizome; aerial part of scape enveloped to high up by leaf sheaths; spathe persistent; perianth segments 1-nerved; filaments of stamens entire; capsule 3-seeded. Seeds rounded.

1. **A. victorialis** L. Sp. pl. (1753) 295; Ldb. Fl. Ross. IV (1853) 184; Turcz. in Bull. Soc. Nat. Mosc. XXVII 2 (1854) 127; Boiss. Fl. Or. V (1884) 245; Shmal'g., Fl. II, 492; Kryl., Fl. Zap. Sib. III (1929) 629;

Kom., Opred. rast. Dal'nevost. kraya I (1931) 365. — A. microdictyum Prokh. in Tr. Prikl. Bot. XXIV 2 (1930) 174. — A. ochotense Prokh. l.c. — A. latissimum Prokh. l.c. — Ic.: Kom., l.c. Plate 112, Figure 1. — Exs.: Billot. Fl. Gall. et German. exs. No. 2543.

Perennial; bulbs 1 to several, attached to an oblique rhizome, cylindric-conical, 1–1.5–(2) cm thick; tunics light brown or grayish-brown, reticulate; scape 30–70 cm long, covered for one-third to one-half its length by smooth often violet-tinged leaf sheaths; leaves 2 or 3, smooth, the blade lanceolate, oblong or broadly elliptic, acute or obtuse, (2)–3–6–(10) cm broad, gradually narrowed into and 2–4 times as long as the petiole; spathe two-thirds as long as to slightly shorter than the umbel, persistent, obtuse or nearly beakless; umbel spherical or rarely hemispherical, rather densely many-flowered, drooping before flowering; pedicels equal, 2–3 times as long as perianth, ebracteolate; segments of the stellate perianth whitish-green, obscurely nerved, 4–5 mm long, elliptic, obtuse, the outer somewhat narrower and shorter; filaments about half as long again as perianth, adnate to perianth merely at base, entire, gradually narrowed from base, narrowly 3-angled, the inner half as broad again as the outer; ovary short-stipitate; style exserted; capsule globose-trigonous, with broadly obcordate valves; seeds globose. June-July.

Woods, wood margins and meadows. — European part: V.-Ka. (E. part), Caucasus: Cis., Dag., E. Transc.; W. Siberia: Ob. (S. part), U. Tob. (N. part), Alt.; E. Siberia: Yen. (S. part), Ang.-Say., Dau.; Far East: Kamch., Okh., Ze.-Bu., Uda, Uss., Sakh. **Gen. distr.**: Centr. Eur., Alt. Eur., W. Med., Bal.-As. Min., Ind.-Him., Mong., Jap.-Ch., N. Am. Described from the mountains of Central Europe.

Note. An attempt was made recently (Prokhanov, l.c.) to break up A. victorialis into elementary entities, but this did not unfortunately embrace the whole of A. victorialis in its old connotation.

A. microdictyum (Urals, Siberia, Mongolia) should, according to Prokhanov, be distinguished from A. victorialis (Europe, Caucasus) and from A. latissimum (Ussuri area, Japan, N. Korea, N. China: Chihli [Hopeh] which have bulb tunics with less developed and irregular
142 reticulation and more slender nervature, narrower and usually paired sheathing leaves, and commonly violet or yellowish flowers.

A. latissimum may be distinguished from A. victorialis by its habitat (the former being a sylvatic, the latter an alpine plant) and broader leaves A. latissimum has obovate-oblong leaves, mostly 3 in number, colorless sheaths, and white flowers.

A. okhotense (Kamchatka, Sakhalin) differs from A. microdictyum in its longer rhizome, darker and broader leaves, and often reddish flowers. The characters distinguishing this species from A. victorialis and from A. latissimum are not indicated.

Economic importance. Readily used for food both fresh and pickled. It has antiscorbutic properties. In many localities in Siberia the plants used to be salted in bulk for winter use.

Section 2. **OPHIOSCORDON** (Wallr.) Vved. comb. n. — Ophioscordon Wallr. Sched. crit. (1822) 129. — Bulb not attached to a rhizome; leaf sheaths buried in the soil; spathe deciduous; perianth segments 1-nerved; filaments entire; capsule 3-seeded; seeds rounded.

2. A. ursinum L. Sp. pl. (1753) 300; Ldb. Fl. Ross. IV, 186; Boiss. Fl. Or. V (1884) 275; Shmal'g., Fl. II, 490. — A. latifolium Gilib. Exerc. phyt. (1792) 470. — Ic.: Rchb. Ic. Fl. Germ. X (1848) f. 1109. — Exs.: HFR No. 2046 a et b.;

Perennial; bulb elongated, ca. 1 cm thick; tunics separating into parallel fibers; scape triquetrous, 15–40 cm long, covered at base with sheathing leaves; leaves 2, slightly shorter than scape, the blade lanceolate to oblong, acute, 3–5 mm broad, rather gradually narrowed into and half as long to as long as the petiole; spathe equaling the umbel, acuminate, deciduous; umbel fasciculate or hemispherical, relatively many-flowered, dense; pedicels equal, half as long again to twice as long as perianth, scabrous or smooth, ebracteolate; segments of the substellate perianth white, obscurely nerved, 9–12 mm long, linear-lanceolate, obtuse to acutish; filaments half as long as perianth at base and adnate to it, subulate; style shorter than perianth; capsule globose-trigonous, with broadly obcordate valves; seeds subglobose. May-June.

Shady woods. — European part: U. Dnp., M. Dnp., V.-Don (W. part); Caucasus: Cisc., W., E. and S. Transc. Gen. distr.: Scand., Centr. Eur., Atl. Eur., Med., Bal.-As. Min. Described from Gotland Island.

Economic importance. Readily used for food in fresh condition.

Section 3. RHIZIRIDIUM Don. Mon. (1826) 55. — Bulbs attached to rhizome, commonly narrow, cylindric-conical or ovoid-conical, sometimes
143 obsolete, rarely ovoid or oblong, commonly clustered; upper part of scape mostly covered to high up with leaf sheaths; perianth segments 1-nerved; filaments entire or toothed, the teeth short or long but never surpassing the anther; seeds angled.

3. A. sacculiferum Maxim. in Mém. Acad. Pétersb. sav. étrang. IX (1859) 281; Kom., Opred. rast. Dal'nevost. kraya I (1931) 366. — Exs.: Karo Pl. Amur. et Zeaen. No. 181.

Perennial; bulbs solitary (or in pairs), attached to a short vertical rhizome, oblong-ovoid, 3/4–1–(1½) cm thick; tunics blackish-brown, splitting, obscurely reticulate-fibrous, enveloping the base of scape; scape (30)–40–60 cm long, covered to 1/4–1/3 with smooth leaf sheaths; leaves (2)–3–(4), canaliculate-triquetrous, sometimes fistulous at base, smooth, 2–3–(4) mm broad, shorter than scape; spathe with beak sometimes half the length of blade, two-thirds as long as to slightly shorter than umbel, persistent; umbel commonly spherical, rather many-flowered, fairly dense; pedicels equal, 2–3–(4) times as long as perianth, subtended by bracteoles; segments of the hemispherical perianth rosy-purple, with a darker nerve, 4.5–5.5 mm long, elliptic, obtuse, the outer scaphoid, slightly shorter than the inner; filaments half as long again as the perianth, at base connate and adnate to perianth, entire, subequal, at base, subulate; style strongly exserted; capsule about equaling the perianth. August-September.

Wet meadows. — Far East: Ze.-Bu., Uss. Gen. distr.: Jap.-Ch. Described from the middle course of the Amur. Type in Leningrad.

4. A. Komarovianum Vved. in Bull. Univ. As. Centr. 19 (1934) 119.

Perennial; bulb solitary (?), attached to a short vertical rhizome, ovoid, 1–1.5–(2) cm thick; tunics blackish-brown, subcoriaceous, entire, scarcely enveloping the base of scape; scape 25–60 cm long, covered to 1/4 or nearly to the middle with smooth leaf sheaths; leaves 4–7, linear, canaliculate, prominently carinate, smooth, 2–5 mm broad, slightly shorter than to equaling the scape; spathe with beak sometimes up to half the length of blade, about equaling the umbel, persistent; umbel spherical, dense, commonly many-flowered; pedicels equal, half as long again as the perianth, dingy rose, intensely colored on the back, 4–4.5 mm long, elliptic, obtuse, the outer scaphoid, slightly shorter than the inner; filaments half as long again as perianth, at base connate and adnate to perianth, entire, subequal at base, subulate; style strongly exserted; capsule slightly exserted. September.

144 Dry slopes.— Far East: Uss. Gen. distr.: Jap.-Ch. (Manchuria). Described from Fadeevka on the Suifun River. Type in Leningrad.

5. **A. Drobovi** Vved. in Trans. Sc. Soc. Turk. I (1923) 125.

Perennial; bulb solitary or paired, attached to an ascending rhizome, narrowly conical to subcylindric, 3/4–1½ cm thick; tunics coriaceous, brownish, splitting, more or less reticulate especially at the margins; scape robust, 50–100 cm long; leaves 5–9, green, broadly linear, 4–15 mm broad, flat, smooth, much shorter than scape; spathe short-acuminate, about equaling the umbel, persistent; umbel spherical, densely many-flowered; pedicels unequal, the inner half as long again as the outer, 2–5 times as long as the perianth, subtended by bracteoles; segments of the subspherical perianth greenish-white, the outer sometimes suffused on the back with dingy purple, green-nerved, 4–5 mm long, broadly oblong, obtuse, the outer scaphoid, barely shorter than the inner; filaments about twice the length of perianth segments, at base connate and adnate to perianth, entire, subulate from a somewhat enlarged base, equal; style exserted from perianth; capsule slightly exceeding the perianth. June-July.

Stony and gravelly slopes.— Centr. Asia: T. Sh. (Kara-tau, SW spurs of Talass Ala Tau). Endemic. Described from Kara-tau Mountains. Type in Tashkent.

6. **A. oreoscordum** Vved. in Not. Syst. Herb. Horti Bot. Petrop. V (1924) 95.

Perennial; bulbs 1–(2?), attached to an ascending rhizome, narrowly conical, ca. 1 cm thick; tunics tawny or brownish, reticulate; scape 25–50 cm long, covered at base or up to 1/3 with subapproximate smooth leaf sheaths; leaves 5–7, linear, 3–6 mm broad, flat, rigid, scabrous-margined, much shorter than scape; spathe short-acuminate, equaling the umbel, persistent; umbel spherical, densely many-flowered; pedicels subequal, the inner slightly longer, (1½)–2–3 times the length of perianth, subtended by bracteoles; segments of the spherical perianth greenish-white, greenish or dingy purple on the back, ca. 4 mm long, broadly elliptic, obtuse, the outer scaphoid, barely shorter than the inner; filaments half as long again as perianth segments, at the very base connate and adnate to perianth, the outer subulate from a somewhat enlarged base, the inner about twice as broad, subulate from a square and often 2-toothed base; style exserted; capsule equaling the perianth. May-July.

145 Stony and gravelly slopes. — Centr. Asia: Tien Shan (Chatkal Range, town of Uzun-akhmat). Endemic. Described from Ungar-tyube mountains. Type in Leningrad.

7. A. Fischeri Rgl. in A.H.P. III (1875) 161; Kryl., Fl. Zap. Sib. III (1929) 624.

Perennial; bulbs several, attached to a rhizome, forming a rather dense clump, cylindric-conical, 1.5–1 cm thick, 5–8 cm long; tunics rufous-brown, reticulate; scape 15–30 cm long, covered at base with approximate smooth leaf sheaths; leaves 2 or 3, semicylindric, ca. 1 mm broad, canaliculate, smooth, usually shorter than the scape; spathe with beak up to 3 times the length of blade, slightly shorter than to slightly exceeding the umbel, persistent; umbel commonly hemispherical, rather few-flowered, fairly loose; pedicels equal, $(1\frac{1}{2})$–2–3 times as long as perianth, subtended by bracteoles; segments of the campanulate perianth dark rosy-violet, with a darker nerve, ca. 5 mm long, acute or obtuse, terminating in a short reflexed point; oblong-elliptic to lanceolate, the outer slightly shorter; filaments slightly exceeding the perianth segments, the inner 2-toothed at base, half as broad again as the outer; style slightly exserted; capsule two-thirds as long as perianth. August.

Rocks and stony places. — W. Siberia: Alt. (rare). **Gen. distr.**: Dzu.-Kash. Mong. Described from Altai. Type in Leningrad.

8. A. **clathratum*** Ldb. Fl. Alt. II (1830) 18; Ej. Fl. Ross. IV (1853) 178; Kryl., Fl. Zap. Sib. III (1929) 627. — Ic.: Ldb. Ic. pl. Fl. Ross. IV (1833) t. 356.

Perennial; bulbs solitary or paired, attached to an ascending rhizome, cylindric-conical, 3/4–1 cm thick, 5–10 cm long; tunics brown, coarsely reticulate; scape 20–50 cm long, terete, smooth, ribbed, covered to 1/3 with smooth distant leaf sheaths; leaves 3, semicylindric, canaliculate, (0.5)–1–2 mm broad, smooth, slightly shorter than to equaling the scape; spathe short-acuminate, two-thirds the length of umbel, persistent; umbel hemispherical or often spherical, rather densely many-flowered; pedicels equal, $1\frac{1}{2}$–2 (3) times as long as perianth, subtended by numerous bracteoles; segments of the narrowly campanulate perianth rose or pale with a purple nerve, 4–5 mm long, linear to linear-lanceolate, obtuse to
146 acutish, the inner slightly longer than the outer; filaments half as long again to twice as long as the perianth, at base connate and adnate to perianth, the outer subulate, the inner twice as broad at base, subulate from a 2-toothed base or rarely entire, the base longer than broad; style strongly exserted; capsule slightly shorter than perianth, with broadly elliptic valves. July.

Steppes, and gravelly and stony slopes. — W. Siberia: Ob (SE part), Alt.: E. Siberia: Ang.-Say. (W. part). **Gen. distr.**: Mongolia. Described from the Charysh River. Type in Leningrad.

* The group of species related to A. lineare (8–18), is one of the most confused. Most of the species presented here have usually been referred to A. lineare or to A. strictum, or else have all been pooled under the one appellation A. lineare. The species of this group to the east of Altai present particular difficulties and their systematics and taxonomy cannot be considered as complete.

9. A. leucocephalum Turcz. in Bull. Soc. Nat. Mosc. XXVII, 2 (1854) 123. — A. flavovirens Rgl. in A.H.P. X (1887) 344, t. VIII, f. 1.

Perennial; bulbs solitary or paired, attached to an ascending rhizome, cylindric, 3/4–1 cm thick, 5–8 cm long; tunics brown, reticulate; scape 30–60 cm long, terete, smooth, slightly ribbed, covered to 1/3 with smooth leaf sheaths; leaves 2 or 3, semicylindric, canaliculate, fistulous, 1–5 mm broad, gradually attenuate toward apex, smooth, much shorter than the scape; spathe with beak sometimes longer than the blade, slightly shorter than the umbel, persistent; umbel spherical, many-flowered, very dense, capitate; pedicels subequal, slightly shorter to slightly longer than perianth, subtended by bracteoles; segments of the campanulate perianth nearly white, with a faint greenish or violet nerve, lustrous, 5–6 mm long, oblong-elliptic, obtuse, the inner about one-fourth as long again as the outer; filaments half as long again to about twice as long as perianth segments, at base connate and adnate to perianth, yellow, the outer subulate, the inner twice as broad at base, subulate from a 2-toothed base, the base twice as long as broad, the teeth the length of the undivided part, often biparted; style strongly exserted; stigma scarcely thickened; capsule slightly shorter than perianth, with broadly elliptic valves. August.

Steppe slopes. — E. Siberia: Dau. Gen. distr.: Mongolia, Kansu. Described from the Dzhida River. Type in Leningrad.

10. **A. flavidum** Ldb. Fl. Alt. II (1830) 7; Ej. Fl. Ross. IV (1853) 179; (excl. syn. Turcz.); Kryl., Fl. Zap. Sib. II (1929) 628. — Ic.: Ldb. Ic. pf. fl.; Ross. IV (1833) 362.

Perennial; bulbs solitary or paired, attached to an ascending rhizome, cylindric-conical, 0.5–1 cm thick, 2–4 cm long; tunics brown; reticulate;
149 scape (20)–25–50 cm long, terete, smooth, ribbed, covered to about the middle with smooth leaf sheaths; leaves 2–4, linear, (2)–3–5–(7) mm broad, with nearly parallel margins, obtuse, often slightly recurved, flat, scabrous-margined, much shorter than scape; spathe scarcely pointed, slightly shorter than umbel, persistent; umbel spherical or rarely hemispherical, densely many-flowered, subcapitate; pedicels about equaling to half as long again (or even twice as long) as perianth, subtended by bracteoles; segments of the campanulate perianth pale greenish-yellow, sometimes suffused with red on the back, lustrous, obscurely nerved, 5–6 mm long, oblong-elliptic, obtuse, the inner about one-fourth as long again as the outer; filaments one-fourth to one-half as long again as perianth segments, at base connate and adnate to perianth, yellow, the outer subulate, the inner twice as broad at base, subulate from a 2-toothed base, the base longer than broad, the teeth commonly as long as the base, sometimes 2-parted; style strongly exserted; stigma scarcely thickened; capsule slightly shorter than perianth, with broadly elliptic valves. July.

Forest or rarely alpine meadows sometimes stony slopes. — W. Siberia: Alt.; Centr. Asia: Dzu.-Tarb. (Tarbagatai). Gen. distr.: Mongolian Altai. Described from Belaya Uba River. Type in Leningrad.

11. **A. Maackii** Prokh. ex Komarov, Opred. rast. Dal'nevost. kraya I (1931) 366. — A. lineare var. Maackii Maxim. in Mém. Acad. Pétersb. sav. étrang. IX (1859) 282.

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Plate X

1. Allium flavescens Bess., 1a) portion of perianth.– 2. A. tytthocephalum Roem. et Schult.; 2a) portion of perianth.– 3. A. polyrrhizum Turcz.; 3a) portion of perianth.– 4. A. Maackii Prokh.; 4a) portion of perianth.

Perennial; bulb solitary or paired, attached to a short rhizome, ovoid-oblong, 1–1.5 cm thick, 2–5 cm long; outer tunics brown, reticulate; inner tunics coriaceous, nearly entire, sometimes produced into a collar; scape (10)–20–50 cm long, terete, smooth, more or less ribbed, covered to 1/4–1/3 with smooth leaf sheaths; leaves 2 or 3, narrowly linear, 1–2–(3) mm broad, slightly narrowed toward base, flat, smooth- or rough-margined, shorter than scape; spathe short-acuminate, two-thirds as long as to slightly shorter than the umbel, persistent; umbel hemispherical or spherical, rather densely many-flowered; pedicels equal, half as long again to twice as long as perianth, subtended by bracteoles; segments of the campanulate perianth rose with a distinct purple nerve, 4–5 mm long, oblong-elliptic to oblong, obtuse or obtusish, the outer somewhat shorter; filaments half as long again to twice as long as perianth, at base connate and adnate to perianth, the outer subulate, the inner twice as broad at base, subulate from a 2-toothed base, this about as long as broad; style strongly exserted; capsule slightly shorter than perianth. June-July. (Plate X, Figure 4a).

150 Rocky and stony places. — Far East: Uss. Endemic (?). Described from the Amur River, Sargu. Type in Leningrad.

12. **A. splendens** Willd. ex Roem. et Schult. Syst. VII, 2 (1830) 1023; Ldb. Fl. Ross. IV (1853) 179 (excl. pl. Kamtsch.). — A. lineare auct. fl. Sib. orient. — Exs.: HFR No. 1242 (sub A. lineari).

Perennial; bulbs solitary or paired, attached to a short ascending rhizome, narrowly cylindric-conical, 1/2–3/4 cm thick, 3–7 cm long; tunics brown, reticulate; scape 25–50 cm long, slender, terete, smooth, slightly ribbed, covered to 1/3–1/2 with smooth sheathing leaves; leaves 3 or 4, linear, 1–4 mm broad, slightly narrowed toward base, flat, scabrous-margined, shorter than scape; spathe short-acuminate, slightly shorter than the umbel, persistent; umbel hemispherical, rather densely many-flowered; pedicels slender, equal, half as long again to twice as long as perianth, subtended by numerous bracteoles; segments of the campanulate perianth commonly light rosy-lilac with a prominent purple nerve, 3.5–4 mm long, oblong-elliptic to oblong, obtuse, the outer somewhat shorter; filaments half as long again to twice as long as perianth segments, at base connate and adnate to perianth, the outer subulate, the inner twice as broad at base, subulate from a 2–3–4-toothed base, the base shorter than broad; style strongly exserted; capsule slightly shorter than perianth segments. July-August.

Light woods, scrub, meadows, and stony slopes. — E. Siberia: Lena-Kol. (S. part), Ang.-Say., Dau., Far East: Ze.-Bu., Uda, Uss., Sakh. Gen. distr.: Mong., Jap.-Ch. Described from Siberia.

13. **A. lineare** L. Sp. pl. (1753) 295; Ldb. Fl. Ross. IV, 178 (pro max parte); Shmal'g., Fl. II, 492; Kryl., Fl. Zap. Sib. III (1929) 625. (excl. var. strictum). — Ic.: Rgl. Fl. turk. (1876) t. XIII. f. 1–5.

Perennial; bulbs solitary or paired, attached to an ascending rhizome, cylindric, conical, 0.5–1 cm thick, 3–4–(6) cm long; tunics brown, reticulate; scape (20)–30–60 cm long, terete, smooth, slightly ribbed, covered to 1/3–1/2 with distant smooth leaf sheaths; leaves 3 or 4, narrowly linear, 1–3 mm broad, flat, smooth- or rough-margined, shorter than

scape; spathe short-acuminate, two-thirds as long as to slightly shorter than the umbel, persistent; umbel spherical or hemispherical, rather loosely many-flowered; pedicels slender, equal, (1½)–2–3 times as long as perianth, subtended by numerous bracteoles; segments of the campanulate perianth rose, obscurely nerved, 3.5–4–(5) mm long, oblong-elliptic to oblong, obtuse, often terminating in a short reflexed point, the outer somewhat shorter; filaments commonly half as long again to twice as long as perianth segments, at base connate and adnate to perianth, the
151 outer subulate, the inner twice as broad at base, subulate from a 2-toothed base, this longer than broad, the teeth sometimes 2-parted; style strongly exserted; stigma scarcely thickened; capsule with broadly elliptic valves, equaling to slightly exceeding the perianth. June-July.

Steppe, meadows, and rarely exposed places. — European part: V.-Ka. (SE part), V.-Don (E. part), Transv., L.D., L.V.; W. Siberia: U. Tob., Irt., Alt. (rare); Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb. **Gen. distr.**: NW Mongolia. Described from Siberia.

14. A. **strictum** Schrad. Hort. Goett. (1809) 7 t. 1; Ldb. Fl. Ross. IV, 178 (excl. pl. cauc.); Shmal'g., Fl. II (1887) 492. — A. volhynicum Bess. Catal. hort. Crem. Suppl. III (1814) 2. — A. Schrenki Rgl. in A.H.P. III (1875) 172. — A. lineare var. strictum Kryl., Fl. Zap. Sib. III (1929) 626. — Ic.: Fl. Yugo-Vost. III (1929) Figure 179. — Exs.: Pl. Finl. exs. No. 572.

Perennial; bulbs solitary or paired, attached to an ascending rhizome, subcylindric, 3/4–1½ cm thick, 6–8–(10) cm long; tunics brown, reticulate; scape 40–60 cm long, terete, smooth, ribbed, covered to 1/3 with distant smooth leaf sheaths; leaves 3 or 4, linear, 3–5 mm broad, flattish, rigid, rough-margined, narrowed toward apex, shorter than scape; spathe short-acuminate, slightly shorter than umbel, persistent; umbel hemispherical or rarely spherical, rather many-flowered, dense; pedicels relatively stout, subequal, 1½–2–(3) times as long as perianth, bracteolate at base; segments of the campanulate perianth rose, with a prominent purple nerve, 4–5 mm long, elliptic to oblong-elliptic, obtuse, the outer slightly shorter; filaments commonly somewhat longer than perianth, at base connate and adnate to perianth, the outer subulate, the inner twice as broad at base, commonly with 2 short or rarely long toothlets at base or entire; style exserted; stigma capitate; capsule slightly shorter than perianth. June-July.

Mostly exposed places and rocks. — European part: Dv.-Pech., V.-Ka. (E.), V.-Don (E.), Transv.; W. Siberia: Ob. (S.), U. Tob., Irt., Alt.; E. Siberia: Lena-Kol., Ang.-Say., Dau.; Far East: Kamch., Okh., Ze.-Bu., Sakh.; Centr. Asia: Balkh., Dzu.-Tarb., T. Sh. (Tur-aigyr). **Gen. distr.**: Centr. Eur., Scand., Mong. Described from Siberia.

15. A. **bogdoicolum** Rgl. in A.H.P. VI (1880) 530.

Perennial; bulb solitary, attached to an ascending rhizome, cylindric, 3/4–1 cm thick, (4)–6–8 cm long; tunics brown, reticulate; scape 20–40 cm long, terete, smooth, slightly ribbed, covered to 1/3 or rarely to about
152 the middle or merely at base with smooth sometimes reddish-tinged leaf sheaths; leaves 3, linear, 2–4 mm broad, flat, with rough nearly parallel margins, subrigid, suberect, obtuse, much shorter than scape; spathe short-acuminate, barely shorter than to equaling the umbel, persistent; pedicels subequal, as long to twice as long as perianth, bracteolate at base;

segments of the campanulate perianth rose, darker on the back, with a prominent purple nerve, 4–5 mm long, oblong-linear to oblong-lanceolate, obtuse, the inner slightly longer than the outer; filaments slightly shorter to barely longer than perianth segments, at base connate and adnate to perianth, rose, the outer subulate, the inner 3 times as broad at base, 2-toothed or entire at base; style exserted; stigma scarcely thickened; capsule barely shorter than perianth, with broadly elliptic valves. July.

Alpine meadows. — Centr. Asia: Dzu.-Tarb. Gen. distr.: Dzu.-Kash, Described from Mount Bogdo. Type in Leningrad.

Note. Closely related to A. amphibolum and needing further study.

16. A. **amphibolum** Ldb. Fl. Alt. II (1830) 5; Ej. Fl. Ross. VI,179; Kryl., Fl. Zap. Sib. III (1929) 624. — Ic.: Ldb. Ic. pl. Fl. Ross. VI (1833) tab. 357.

Perennial; bulbs solitary or paired, attached to an ascending rhizome, cylindric-conical, 1–1.5 cm thick, (4)–6–8 cm long; tunics brown, reticulate; scape 10–25 cm long, terete, smooth, slightly ribbed, covered at base or up to 1/3 with smooth subapproximate sometimes reddish-tinged sheaths; leaves 2–4, linear, 2–5 mm broad, flat, rough-margined, slightly tapering at both ends, usually somewhat recurved, obtuse, slightly shorter than to equaling the scape; spathe short-acuminate, about equaling the umbel, persistent; umbel spherical or hemispherical, rather many-flowered, dense, capitate; pedicels equal, slightly shorter than to equaling the perianth, bracteolate at base; segments of the campanulate perianth rose or rose-purple, with a darker nerve, lustrous, 5–6 mm long, oblong-lanceolate to lanceolate, obtusish, the outer slightly shorter than the inner; filaments slightly exceeding to half as long again as perianth segments, at base connate and adnate to perianth, dark rose, the outer subulate, the inner 1-toothed at base; style strongly exserted; stigma scarcely thickened; capsule slightly shorter than perianth, with broadly elliptic valves. June-July.

Stony and gravelly slopes in the alpine zone. — W. Siberia: Alt.; E. Siberia: Ang.-Say. (SE). Gen. distr.: Mong. Described from the Charysh River and from the vicinity of Riddersk. Type in Leningrad.

153 17. **A. Szovitsii** Rgl. in A. H. P. III (1875) 171 (quoad pl. cauc.)
A. strictum Ldb. Fl. Ross. IV (1853) 178 (quod. pl. cauc.). —
A. strictum var. anodon Boiss. Fl. Or. V (1884) 247. —
A. pseudostrictum Albov in Tr. Tifl. Sada I (1895) 238.

Perennial; bulbs solitary or paired, attached to an ascending rhizome. cylindrical-conical, 1–1.5 cm thick, 3–10 cm long; tunics brown, reticulate; scape 15–30 cm long, terete, smooth, slightly sulcate, covered to 1/4 with smooth sometimes purple-tinged leaf sheaths; leaves 2 or 3, linear, 2–4 mm broad, flat, rough-margined; obtuse, scarcely narrowed toward base, shorter to slightly longer than scape; spathe short-acuminate, slightly shorter than to equaling the umbel, persistent; umbel hemispherical or subspherical, dense, subcapitate; pedicels equal, about half as long to slightly longer than perianth, stout, subtended by few bracteoles; segments of the campanulate perianth rose or nearly white, with a prominent purple nerve, (5)–6–7 mm long, lanceolate to oblong-lanceolate, obtuse to acutish, the inner slightly longer than the outer; filaments half as long again to twice

as long as perianth segments, at base connate and adnate to perianth, the outer subulate, the inner twice as broad, subulate from a 2-toothed base or sometimes entire; base much longer than broad; style strongly exserted; stigma subcapitate; capsule slightly shorter than perianth. July-August.

Mountain meadows and stony slopes. — Caucasus: Cisc., Dag., W., E. and S. Transc. Gen. distr.: Arm.-Kurd. Described from Karabakh, town of Kins. Type in Leningrad.

18. A. **brachyodon** Boiss. Diagn. pl. or. nov. I, 7 (1846) 117. — A. strictum var. brachyodon Boiss. Fl. Or. V (1884) 247. — Ic.: Fl. Turkm. II (1932) 275.

Perennial; bulbs 2 or 3, attached to an ascending rhizome, cylindric, 1–1.5 cm thick, 5–10 cm long; tunics grayish-brown, coriaceous, splitting, coarsely reticulate; scape 10–20 cm long, terete, smooth, slightly sulcate, covered at base with smooth, approximate leaf sheaths; leaves 3 or 4, linear, 2–3 mm broad, flat, rough-margined, equaling the scape; spathe short-acuminate, equaling the umbel, persistent; umbel spherical or subspherical, densely few-flowered; pedicels equal, slightly shorter than perianth, subtended by few bracteoles; segments of the broad perianth whitish, rosy on the back, with a dark purple nerve, ca. 5 mm long, obtuse, the outer oblong, slightly shorter than the ovate inner segments; filaments half as long again as perianth segments, at base connate and adnate to perianth,
154 the outer subulate, the inner twice as broad at base, subulate from a 2-toothed base, this longer than broad, the teeth often secondarily 2-toothed; style exserted; stigma subcapitate; capsule equaling the perianth, with rounded valves. July.

Stony places. — Centr. Asia: Mtn. Turkm. (Chapan-dag). Gen. distr.: Iran. Described from Mount Kuh-Daen. Cotype in Leningrad.

19. A. **oreoprasoides** Vved. in Trans. Sc. Soc. Turk. II (1925) 29, t. I

Perennial; bulbs in a cluster of several, attached to an ascending cylindric-conical rhizome, 0.5–1 cm thick; tunics rufous-brown, reticulate; scape 20–30 cm long, sulcate, covered at base with smooth approximate leaf sheaths; leaves 4–6, linear, 2–3 mm broad, flat, smooth, attenuate at apex, slightly recurved, exceeding the middle of scape; spathe with beak sometimes the length of blade, one-half to two-thirds as long as the umbel, persistent; umbel hemispherical or spherical, densely many-flowered; pedicels equal, 2–3 times as long as perianth, bracteolate at base; segments of the campanulate-ovoid perianth pale rose, with a purple nerve, 4–5 mm long, subequal, oblong-elliptic, acutish, the outer scaphoid; filaments one-fourth as long again as perianth, at base connate and adnate to perianth, entire, subulate from a somewhat enlarged base, the inner half as broad again; style strongly exserted; capsule equaling the perianth. May.

Gravelly slopes. — Centr. Asia: Tien Shan (Kara-tau). Endemic. Described from Okuz-bulak. Type in Tashkent.

20. A. **oreodictyum** Vved. in Bull. Univer. As. Centr. 19 (1934) 119.

Perennial; bulbs ovoid-conical, 3/4–1 cm thick, 3–4 cm long, in a cluster of several, attached to a short rhizome; tunics brown, reticulate; scape 5–15 cm long, slender, sulcate, smooth, covered at base or up to 1/4 its length with smooth leaf sheaths; leaves 2, filiform, 1/2–1 mm broad,

semicylindric, canaliculate, smooth, apparently equaling the scape; spathe with beak sometimes half the length of blade, half as long as the umbel, persistent; umbel brittle, hemispherical or subspherical, relatively few-flowered, loose; pedicels equal, $1\frac{1}{2}$–2–3 times as long as perianth, subtended by numerous bracteoles; segments of the broadly campanulate to subspherical perianth rose, with a prominent dingy green nerve, 2–$3\frac{1}{2}$ mm long, obtuse or mucronulate, the inner elliptic to oblong-elliptic, the outer ovate to oblong, slightly concave; filaments slightly exceeding to half as long again as perianth, at base connate and adnate to perianth,
155 subulate from a triangular and sometimes obtusely toothed base, the inner twice as broad at base; style scarcely exserted; capsule globose, scarcely shorter than perianth. July.

Gravelly slopes. — Centr. Asia: Pam.-Al. (Mogian-darya: Sor-sai, Kshtut). Endemic. Described from Sor-sai. Type in Leningrad.

21. **A. scabriscapum** Boiss. et Ky. in Boiss. Diagn. pl. or. nov. I, 13 (1853) 31; Boiss. Fl. Or. V (1884) 246. — Exs.: Herb. Fl. As. Med. No. 339.

Perennial; bulbs in a cluster of several, attached to a short ascending rhizome, cylindric-conical, ca. 1 cm thick; tunics brownish, reticulate; scape 25–50 cm long, erect, sulcate, scabrous or rarely nearly smooth, covered at base with smooth or scabrous or nearly villous leaf sheaths; leaves 4–6, linear, 2–4 mm broad, flat, scabrous or sometimes hairy, much shorter than scape; spathe short-acuminate, one-third to two-thirds as long as the umbel, persistent; umbel hemispherical or often spherical, loosely many-flowered, brittle; pedicels erect, 3–4 times as long as perianth, subtended by numerous bracteoles; segments of the broadly campanulate to subspherical perianth yellow, in herbarium especially on the back brownish, 4–6 mm long, subequal, oblong, obtuse; filaments two-thirds as long as to equaling the perianth, at base connate and adnate to perianth, entire, subulate from a triangular base, the inner twice as broad; style exserted; capsule slightly shorter than perianth. May-June.

Gravelly slopes in the lower mountain zone. — Caucasus: S. Transc. (Nakhichevan); Centr. Asia: Mtn. Turkm., T. Sh. (Kara-tau, Tashkent Ala Tau). **Gen. distr.**: Iran. Described from Mount El'brus. Cotype in Leningrad.

Note. Plants from W. Tien Shan are distinguished by more developed vesture and, in this respect, they approach A. trachyscordum, another W. Tien Shan species.

22. **A. trachyscordum** Vved. in Herb. Fl. As. Med. (1925) No. 65.

Perennial; bulbs in a cluster of several, attached to an ascending rhizome, cylindric-conical; tunics brown, reticulate; scape 25–30 cm long, erect, sulcate, very scabrous to nearly hairy, covered at base or up to 1/4 its length with villous leaf sheaths; leaves 3 or 4, linear, 1.5–3 mm broad, flat, usually hairy, the hairs rarely confined to the margin, much shorter than scape; spathe short-acuminate, one-third to two-thirds as long as the umbel, subtended by numerous bracteoles; segments of the
156 broadly campanulate perianth reddish-violet, tawny-brown in drying, commonly 7 or rarely 5–6 mm long, subequal, oblong-lanceolate, acute, very rarely obtuse; filaments slightly shorter than perianth, at base connate

and adnate to perianth, entire, subulate from a slightly enlarged base, the inner slightly broader; style somewhat exserted; capsule two-thirds as long as perianth. June-July.

Outcrops of mottled strata and stony slopes. — Centr. Asia: Tien Shan (Kara-tau, Aleksandrovskii Range, Chu-Ili Mountains). Endemic. Described from Aleksandrovskii Range, Uch-bulak. Type in Tashkent.

23. **A. guzaricum** Rgl. in A.H.P. X (1887) 349, tab. III, Figure 3.

Perennial; bulbs in a cluster of several, attached to a short ascending rhizome, cylindric-conical, ca. 1/2 cm thick; tunics brownish, reticulate; scape 5–15 cm long, slender, sulcate. smooth, covered at base with scabrous or hairy leaf sheaths; leaves 3 or 4, narrowly linear, 0.5–1.5 mm broad, apparently flat, hairy, much shorter than scape; spathe short-acuminate, one-half to one-third the length of the umbel, persistent; umbel fasciculate or hemispherical, loosely few-flowered; pedicels equal, half as long again to twice as long as perianth, bracteolate at base; segments of the campanulate perianth violet, brownish-tinged, 7–8 mm long, subequal, linear-lanceolate, tapering, acute; filaments two-thirds as long as perianth segments, connate, entire, the outer triangular-subulate, the inner twice as broad, narrowly triangular; style not exserted; capsule half as long as perianth. June-July.

Stony slopes. — Centr. Asia: Pam.-Al. (Zeravshan Valley). Endemic. Described from the valley indicated. Type in Leningrad: Zeravshan Valley, Guzar-Kshtut.

24. **A. inconspicuum** Vved. in Not. Syst. Herb. Horti Bot. Petrop. V (1924) 93. — A. tataricum auct. fl. As. Med. p.p.

Perennial; bulbs 1–4, attached to an oblique rhizome, oblong-ovoid, 1/2–3/4–(1$\frac{1}{2}$) cm thick, 1–1$\frac{1}{2}$–(3) cm long; tunics brown, reticulate; scape 15–30 cm long, slender, covered at base with smooth or rarely scabrous leaf sheaths; leaves 1 or 2, narrowly linear, often subfiliform, 0.5–1 mm broad, canaliculate, smooth or rarely scabrous on the margin and on veins, slightly shorter than scape; spathe short-acuminate, one-third to two-thirds as long as the umbel, persistent; umbel fasciculate, loosely few-flowered; pedicels subequal, half as long as to equaling or exceeding the perianth, ebracteolate; segments of the narrowly campanulate perianth pale or dingy violet, brownish-violet on the back, 8–11 mm long, subequal, linear-
157 lanceolate to oblong-lanceolate, tapering, acute; filaments about half as long as perianth segments, for 1/3 their length connate and adnate to perianth, entire, the outer triangular-subulate, the inner narrowly triangular, twice as broad as the outer; anthers violet; style not exserted; capsule half the length of perianth, the valves suborbicular, emarginate, crestless. April-May.

Foothills, chiefly on outcrops of mottled strata. — Centr. Asia: Pam.-Al. (Nura-tau, low mountains on left bank of Zeravshan), T. Sh. (W. Tien Shan). Endemic. Described from vicinity of station of Ziadin and Tashkent-Chimkent mottled area. Type in Leningrad.

Note. The herbarium material indicates the occurrence in the Kara-tau Mountains of specimens resembling in flower color A. Barszczewskii, a race distributed in that area.

25. **A. drepanophyllum** Vved. in Bill. Univer. As. Centr. 19 (1934) 120.

Perennial; bulbs 1–3, attached to an oblique rhizome, (0.5) 0.75–1.5 cm thick, (1.5) 3–6 cm long; tunics brown, reticulate; scape 15–45 cm long, covered at base with scabrous or smooth leaf sheaths; leaves 4 or 5, linear, 2.5–10 mm broad, flat, falcately recurved, obtuse, smooth or rough-margined, shorter than scape; spathe short-acuminate, (one-third) one-half as long as to slightly shorter than the umbel, relatively few-flowered, loose; pedicels unequal, half as long again to twice as long, in fruit 3 times as long as perianth, subtended by few bracteoles; segments of the narrowly campanulate perianth brownish-violet, darker on the back, 8–10 mm long, equal, linear-lanceolate, tapering, acute; filaments half as long as perianth segments, connate, entire, the outer triangular-subulate, the inner twice as broad, triangular; anthers violet or yellow; style exserted; capsule half as long as perianth; valves suborbicular, emarginate, crestless. May.

Lower mountain zone, chiefly on outcrops of mottled strata. — Centr. Asia: Pam.-Al. (SW). Endemic. Described from Baisun area, Khodzha-ipak. Type in Tashkent.

Note. A. drepanophyllum is the most devious form in the A. incospicuum series, and it approaches A. xiphopetalum in its broad falcate leaves. Its inclusion in the A. inconspicuum series, as here adopted, needs checking.

26. **A. xiphopetalum** Aitch. et Baker in Trans. Linn. Soc. III (1888) 118, Vol. XLVIII. — A. tataricum Boiss. Fl. Or. V (1884) 246 (quoad pl. Kotschyanam).

Perennial; bulbs 1–3, attached to an oblique rhizome, narrowly conical
158 to ovoid-conical, 0.75–1 cm thick, 3–4 cm long; tunics light brown, finely reticulate; scape (20) 30–40 cm long, covered at base or up to one-third its length with smooth leaf sheaths; leaves 3 or 4, linear, 3–5–(10) mm broad, flat, falcate, obtuse, smooth or rough-margined, about half the length of scape; spathe short-acuminate, slightly shorter than the umbel, persistent; umbel fasciculate or hemispherical, densely few-flowered; pedicels subequal, half as long as to equaling or (in fruit) to twice as long as the perianth, subtended by numerous bracteoles; segments of the campanulate perianth rosy-violet, with a darker nerve, 9–12 mm long, tapering, subacute, the outer oblong-lanceolate, slightly longer than the lanceolate inner segments; filaments two-thirds to three-quarters as long as perianth segments, connate and adnate to perianth up to the middle, entire, the outer triangular-subulate, the inner twice as broad, triangular; anthers commonly violet; style not exserted; capsule half as long as perianth, the valves suborbicular, emarginate, crestless. April-May.

Stony slopes. — Centr. Asia: Mtn. Turkm., Pam.-Al. (Pistali-tau, Sulyukta). **Gen. distr.**: Iran. Described from Paropamisus. Cotype in Leningrad.

27. **A. Barszczewskii** Lipsky in A. H. P. XVIII (1900) 114. — A. tataricum auct. fl. As. Med. p. p. — Ic.: Rgl. Fl. Turk. (1876) t. XIV, f. 1–5.

Perennial; bulbs (1) 2 to several, attached to an oblique rhizome, elongate-conical to ovoid-conical, 0.75–1.5 cm thick, 3–5 cm long; tunics

brown, reticulate; scape 20–60 cm long, covered to 1/3 with leaf sheaths, these smooth or the lower scabrous; leaves 3–5, linear, 1–3 mm broad, canaliculate, smooth or rough-margined, shorter than scape; spathe short-acuminate, (one-third) half as long as the umbel, persistent; umbel fasciculate or fasciculate-hemispherical, commonly many-flowered, mostly dense; pedicels unequal, slightly shorter than to 2 (3) times as long as perianth, usually ebracteolate; segments of the campanulate perianth white, pale rose, rose or rosy-violet, 7–14 mm long, equal or rarely the inner to 1/4 longer, linear-lanceolate, lanceolate or oblong-lanceolate, tapering, acute; filaments one-half to two-thirds the length of perianth segments, to 1/3–1/2 their length, connate and adnate to perianth, entire, the outer triangular-subulate, the inner triangular and 2–3 times as broad as the outer; anthers yellow; style not exserted; capsule one-half to two-thirds as long as perianth, the valves crestless. May-August.

Stony or rarely fine-earth slopes, from the lower to the upper mountain zone. — Centr. Asia: Pam.-Al., T. Sh. Endemic. Described from Karategin: Sary-kugi-kalon Pass. Type in Leningrad.

159 Note. A. Barszczewskii, as here established represents a very polymorphic residue of what has generally been offered by authors of Central Asian flora under the name A. tataricum. There is undoubtedly need for further subdivision of A. tataricum auct. and A. Barszczewskii would thus become associated with the rose-flowered race of high mountains, conforming to Lipsky's type.

28. A. lutescens Vved. in Herb. Fl. As. Med. (1935) No. 610.

Perennial; bulbs solitary or paired, attached to an oblique rhizome, elongate-conical to ovoid-conical, 0.75–1 cm thick, 2–5 cm long; tunics brown, reticulate; scape 20–35 cm long, covered to 1/3 or nearly to the middle with smooth leaf sheaths; leaves 3–5, linear, 1–1.5 mm broad, canaliculate, one-half to two-thirds as long as the umbel, persistent; umbel fasciculate or fasciculate-hemispherical, rather many-flowered, dense; pedicels subequal, slightly shorter than to half as long again (or even twice as long) as perianth, ebracteolate; segments of the narrowly campanulate perianth pale yellow, 8–12 mm long, subequal, linear-lanceolate, strongly tapering, acute; filaments half the length of perianth segments, connate and adnate to perianth up to the middle, entire, the outer triangular-subulate, the inner twice as broad, triangular; anthers yellow; style not exserted; capsule half as long as perianth, the valves suborbicular, crestless. May.

Gravelly and stony slopes. — Centr. Asia: Tien Shan. Endemic. Described from the Mashat River. Type in Tashkent.

Note. Known from a very restricted area in the NW foothills of the Talass Ala Tau, where it was gathered by many collectors.

29. **A. longiradiatum** Vved. in Opred. rast. okrest. Tashk. I (1923) 67. — A. tataricum var. longiradiatum Rgl. in A. H. P. III (1875) 180. — Ic.: Rgl. Fl. turk. (1876) t. XIV, f. 6. — Exs.: Herb. Fl. As. Med. No. 60.

Perennial; bulbs 1–2–(4), attached to an oblique rhizome, ovoid-conical or elongate-conical, 0.75–1.5 cm thick, 2–5–(7) cm long; tunics brown,

reticulate; scape 25–50 cm long, covered to 1/3 with leaf sheaths, these smooth or the lower ones often scabrous; leaves 4 or 5, linear, 1–3 mm broad, canaliculate, fistulous, smooth or scabrous, commonly shorter than scape; spathe short-acuminate, one-eighth to one-fourth as long as the umbel, persistent; umbel spherical or rarely hemispherical, loosely many-flowered; pedicels subequal, 4–6 times as long as perianth, bracteolate at base, the outer ones usually ascending; segments of the narrowly campanulate perianth purplish-violet, 7–9 mm long, subequal, linear-lanceolate, tapering, acute; filaments half as long as perianth
160 segments, connate and adnate to perianth up to the middle, entire, the outer triangular-subulate, the inner 3 times as broad, triangular; style not exserted; ovary crestless; capsule half as long as perianth. May.

Foothills, chiefly on outcrops of mottled strata. — Centr. Asia: Tien Shan (Tashkent Ala Tau). Endemic. Described from the vicinity of Tashkent. Type in Tashkent.

30. A. **dolichomischum** Vved. in Herb. Fl. As. Med. (1935) No. 606.

Perennial; bulbs 1–2–(3), attached to an oblique rhizome, oblong-ovoid to conical-ovoid, (0.5)–0.75–1 cm thick, 1.5–3 cm long; tunics brown, finally reticulate; leaves 4 or 5, linear, (1)–3–4 mm broad, flat, revolute, falcately recurved, smooth, shorter than scape; spathe short-acuminate, one-fourth to one-third (or one-half) as long as the umbel, persistent; umbel hemispherical, commonly many-flowered, loose; pedicels subequal, (2)–3–4 times as long as perianth, bracteolate; segments of the narrowly campanulate perianth commonly pale violet, with a dark violet nerve, rarely dark violet throughout, 5–7 mm long, equal, linear-lanceolate to lanceolate, tapering, acute, the outer slightly broader; filaments two-thirds as long as perianth, connate and adnate to perianth for 1/3 their length, entire, the outer triangular-subulate, the inner twice as broad, narrowly triangular; anthers yellow or violet; style not exserted; ovary crestless; capsule two-thirds as long as perianth. May-June. (Plate XI, Figure 1, a).

Middle mountain zone, on outcrops of mottled strata (always?). — Centr. Asia: Pam.-Al. (W. part of Gissar Range, Chul'bair). Endemic. Described from Chul'bair: Sina. Type in Tashkent.

31. A. **dolichostylum** Vved. in Bull. Univ. As. Centr. 19 (1934) 120.

Perennial; bulbs 1–3, attached to an oblique rhizome, elongate-conical to ovoid-conical, 0.5–1.5 cm thick, 1.5–4 cm long; tunics brown; reticulate; scape 30–70 cm long, covered to 1/4–1/3 its length with smooth or rarely scabrous leaf sheaths; leaves 4 or 5, linear, 1.5–4 mm broad, canaliculate, commonly rough-margined, shorter than scape; spathe short-acuminate, one-half to two-thirds as long as the umbel, persistent; umbel commonly hemispherical, rarely fasciculate-hemispherical to subspherical, densely many-flowered; pedicels subequal, equaling to half as long again (or twice as long) as perianth, subtended by numerous bracteoles; segments of the narrowly campanulate perianth rose, with a darker nerve, (5)–7–9 mm long, equal, tapering, acute, the inner lanceolate to linear-lanceolate, the outer oblong-lanceolate to lanceolate; filaments
161 equaling or barely exceeding the perianth segments, connate and adnate to perianth for 1/6 their length, entire, the outer triangular-subulate, the inner narrowly triangular, half as broad again as the outer; anthers

commonly yellow; style exserted; capsule half as long as perianth; valves suborbicular, emarginate, crestless. June-July.

Stony and gravelly slopes in the middle mountain zone. — Centr. Asia: Pam.-Al. (Alai Range), T. Sh. Endemic. Described from Sary-chilek. Type in Leningrad.

Note. Small-flowered specimens (with flowers 5–6 mm long), often collected in Chatkal Range, deserve further study.

32. **A. inderiense** Fisch. ex Bge. in Goebel. Reise... II (1838) 311. — A. tataricum Ldb. Fl. Ross. IV (1853) 185; Boiss. Fl. Or. V (1884) 246 (quoad pl. Lehmannianam). — A. diaphanum Janka, Linnaea XXX (1860) 605. — A. Beckerianum Rgl. Ind. Sem. Horti. Petrop. (1860) 30. — Ic.: Fl. Yugo-Vostoka III (1929), Figure 180.

Perennial; bulbs 1–4, attached to an oblique rhizome, ovoid-conical, 0.75–1.5 cm thick, 1–3 (4) cm long; tunics brown, reticulate; scape 20–40 cm long, covered at base or up to one-fourth its length with smooth leaf sheaths; leaves 3–5, linear, 1–3 mm broad, canaliculate, commonly rough-margined, shorter than scape; spathe short-beaked, half as long as the umbel, peristent; umbel fasciculate or fasciculately hemispherical, rarely hemispherical, relatively few-flowered, dense; pedicels subequal, half as long as to equaling or (in fruit) half as long again as the perianth, rosy-violet, with a darker nerve, 7–10 mm long, equal, tapering, acute, the outer oblong-lanceolate, the inner lanceolate; filaments equaling the perianth segments, connate and adnate to perianth for 1/5 their length, entire, the outer triangular-subulate, the inner half as broad again, narrowly triangular; anthers violet; style exserted; capsule half as long as perianth; valves suborbicular, emarginate, crestless. May-June.

Solonetz steppes. — European part: L. V.; W. Siberia: U. Tob. (SE); Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from Lake Inder. Type in Leningrad.

33. **A. stephanophorum** Vved. in Not. Syst. Herb. Horti Bot. Petrop. V (1924) 94. — A. tataricum auct. fl. As. Med. p. p.

Perennial; bulbs 1–4, attached to an oblique or ascending rhizome, elongate-conical to oblong-ovoid, 0.5–1.5 cm thick, 2–5 cm long; tunics rufous-brown, reticulate; scape 15–50 cm long, covered at base with leaf sheaths, these smooth or (especially the lower ones) scabrous; leaves 3–5, narrowly linear, 0.5–2.5 mm broad, slightly canaliculate, often recurved,
162 commonly rough-margined; spathe short-acuminate, one-half to two-thirds the length of umbel, persistent; umbel fasciculate or nearly hemispherical, relatively few-flowered, rather dense; pedicels unequal, half as long as to slightly longer than or (in fruit) twice as long as perianth, ebracteolate; segments of the narrowly campanulate perianth dingy violet or rosy-violet (?), with a darker nerve, tapering, acutish to obtusish, the outer (6)–8–12 mm long, linear-lanceolate to lanceolate, one-fourth as long again as the lanceolate to oblong-lanceolate inner segments; filaments half as long as perianth segments, connate and adnate to perianth up to the middle, entire, the outer triangular-subulate, the inner about 3 times as broad, triangular; anthers yellow; style not exserted; ovary with a crest of cartilaginous teeth surrounding the style; capsule half as long as perianth. May.

Argillaceous and gravelly slopes in the lower mountain zone. — Centr. Asia: Pam.-Al. (Turkestan Range, Nura-tau, Baisun low mountains, Shurab), T.Sh. (Mogol-tau). Endemic. Described from Turkestan Range. Type in Leningrad.

Note. Plants collected in Kyzyl Kum deserts (Ak-tau, Changil'dy) are very closely related to A. stephanophorum, but are distinguished by the equal perianth segments. These plants require further study.

34. A. **tenuicaule** Rgl. in A.H.P. X (1887) 348, t.IV, f.4. — A. tataricum auct. fl. As. Med. p.p.

Perennial; bulbs 2–6, attached to a rhizome, ovoid-conical, 0.5–0.75 cm thick, 1–2 cm long; tunics brown, reticulate; scape 10–20–(3) cm long, slender, covered to 1/4–1/3 with smooth or scabrous leaf sheaths; leaves 2 or 3, subfiliform, revolute, rough-margined; spathe short-acuminate, slightly shorter than the umbel, persistent; umbel fasciculate or nearly hemispherical, commonly few-flowered, dense; pedicels subequal, half as long as perianth, ebracteolate; segments of the campanulate perianth dark rose, 7–8 mm long, subequal, acute, the outer oblong, half as broad again as the lanceolate inner segments; filaments two-thirds as long as perianth, connate and adnate to perianth up to the middle, entire, the outer triangular-subulate, the inner twice as broad, triangular; anthers yellow; style not exserted; ovary crested around the style base; capsule two-thirds as long as perianth. June-July.

Gravelly and stony slopes in the alpine zone. — Centr. Asia: Pam.-Al. (Zeravshan Valley, Chul'bair and Kugitang). Endemic. Described from Zeravshan River valley. Type in Leningrad.

35. A. **oreoprasum** Schrenk. in Bull. Scient. Acad. Pétersb. X (1842) 354; Ldb. Fl. Ross. IV, 185. — Ic.: Rgl. Fl. turk. (1876) t.XIV, f.7–9.

163 Perennial; bulbs in a cluster of several, attached to a horizontal rhizome, cylindric-conical, 1–1.5 cm thick; tunics rufous-brown, reticulate; scape 20–40 cm long, always ribbed, subancipital at the summit; leaves 3–5, narrowly linear, 1–4 mm broad, more or less canaliculate, rough- or smooth-margined, approximate at scape base, slightly shorter than scape; spathe short-acuminate, one-half to two-thirds as long as the umbel, persistent; umbel fasciculate or fasciculately hemispherical, rather few-flowered; pedicels equal, $1\frac{1}{2}$–2–(3) times as long as perianth, bracteolate; segments of the hemispherical perianth rose, with a prominent dingy purple nerve, 5–7 mm long, subequal, broadly elliptic, acute, reflexed at the tips; filaments one-half to two-thirds the length of perianth segments, connate and adnate to perianth for 1/3 their length, entire, subulate from a triangular base, the inner twice as broad, rather broadly triangular; style not exserted; capsule slightly shorter than perianth. May-July.

Rocks and stony slopes. — Centr. Asia: Dzu.-Tarb. (Dzungarian Ala Tau), Pam.-Al. (Alai Range, Pamirs), T. Sh. (Central Tien Shan, Aleksandrovskii Range, Talass Ala Tau). Gen. distr.: Dzu.-Kash., Tibet. Described from Kul'-asu. Type in Leningrad.

Note. Location: Kara-tau (Maev) and Guberlinskie Mountains (Regel') very dubious.

36. A. **odorum** L. Mant. (1767) 62; Ldb. Fl. Ross. IV, 185; Turcz. in Bull. Soc. Nat. Mosc. XXVII 2 (1854) 127; Krylov, Fl. Zap. Sib. III (1929) 630; Kom., Opred. rast. Dal'nevost. kraya I (1931) 365. — A. tataricum L. f. Suppl. (1781) 196. — Ic.: Redouté Lil. II (1805) t. 98. — Exs.: HFR, No. 1241.

Perennial; bulbs 1–3, rarely moré, attached to a horizontal rhizome, narrowly cylindric-conical, obsolescent; tunics rufous-brown, reticulate; scape (15)–30–50 cm long, slightly ribbed; leaves 2 or 3, narrowly linear, (1.5)–2–4 mm broad, approximate at scape base, slightly shorter than the scape; spathe short-acuminate, one-half to two-thirds as long as the umbel, persistent; umbel fasciculate or fasciculately hemispherical, rather many-flowered, dense; pedicels equal, 2–3 times as long as perianth, bracteolate at base; segments of the substellate perianth white with a greenish nerve, 6–9 mm long, subequal, lanceolate or elliptic, obtuse to acutish; filaments two-thirds as long as perianth, connate and adnate to perianth for 1/4 their length, entire, subulate from a slightly enlarged base; style not exserted; capsule 5 mm long. July-August.

Meadows, solonetz soils, and slopes, rarely as a weed. Cultivated in the Far East. — W. Siberia: Irt. (E.), Alt.; E. Siberia: Lena-Kol., Ang.-Say., Dau.; Far East: Ze.-Bu., Uss.; Centr. Asia (advent.): Pam.-Al.
164 (Roshan), T. Sh. (Aleksandrovskii Range). **Gen. distr.**: Ind.-Him., Jap.-Ch., Tibet. Described from S. Europe.

Note. Prokhanov (Tr. Prikl. Bot. XXIV, 2, 1930, 175) establishes the cultivated plant as a distinct species, A. chinense Don, distinguishing it by its flat carinate leaves and white flowers. The author has, however, observed similar characteristics in herbarium specimens of wild-growing A. odorum.

37. A. **angulosum** L. Sp. pl. (1753) 299; Ldb. Fl. Ross. IV, 180; Kryl. Fl. Zap. Sib. III (1929) 619. — A. acutangulum Cat. sem. hort. Goett. (1808); Shmal'g. Fl. II, 494. — A. laxum Don Mon. (1926) 63. — Ic.: Syreishch., Ill. Fl. Mosk. gub. I (1906) 236. — Exs.: Kerner. Fl. exsicc. Austro-Hung. No. 3481.

Perennial; bulbs 1–2–(3), attached to a horizontal or ascending rhizome, narrowly conical, 0.5–0.75 cm thick; tunics grayish, membranous, more or less entire; scape 25–50 cm long, angled, slender; leaves 5 or 6, approximate at scape base, more or less carinate, narrowly linear, 2–4 mm broad, obtuse, smooth, erect, exceeding half the length of scape; spathe short-acuminate, half as long as the umbel, persistent; umbel fasciculate-hemispherical or often hemispherical, rather densely many-flowered; pedicels equal, 2–3 times the length of perianth, subtended by numerous bracteoles; segments of the broadly campanulate perianth rosy-violet, obscurely nerved, 6–(7) mm long, acute, oblong, subequal; filaments three-quarters as long as to slightly shorter than perianth segments, at base connate and adnate to perianth, entire, subulate from a slightly enlarged base, the inner somewhat broader; style not exserted; capsule about two-thirds as long as perianth. June-August.

Meadows. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Ka., U. Dnp., V.-Don, Transv., Bl., L. Don, L. V.; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Ang.-Say. (W.) **Gen. distr.**: Centr. Eur. Described from Siberia.

38. A. **albidum** Fisch. ex Bess. Enum. pl. Volhyn. (1822) 55; Ldb. Fl. Ross. IV, 181 (quoad pl. cauc.); Shmal'g., Fl. II, 494. — A. angularum var. caucasicum Rgl. in A.H.P. III (1875) 145. — Ic.: Rchb. Ic. pl. crit. (1827) f. 592.

Perennial; bulbs 2–4, attached to a horizontal rhizome, conical, 0.75–1 cm thick; tunics grayish, membranous, more or less entire; scape 20–30 cm long, more or less angled, ribbed; leaves 6, narrowly linear, 1–2–(4) mm broad, flattish, canaliculate, somewhat fleshy, obtuse, commonly smooth, about half as long as the scape; spathe short-acuminate, two-thirds as long as the umbel, persistent; umbel hemispherical to subspherical, densely many-flowered; pedicels equal, slightly longer than or half as long again to twice as long as perianth, ebracteolate; segments
165 of the hemispherical substellate perianth white, sometimes reddish-tinged, obscurely nerved, 4–5 mm long, obtuse, oblong to oblong-elliptic, entire, the outer scaphoid, the inner one-fourth as long again; filaments equaling to barely exceeding the perianth segments, at base connate and adnate to perianth, entire or sometimes the inner ones 2-toothed, the outer triangular-subulate, the inner narrowly triangular, half as broad again as the outer; style exserted; capsule slightly shorter than perianth. July.

Rocky places. — European part: Crim.; Caucasus: Cisc., Dag., E. and S. Transc. **Gen. distr.**: Arm.-Kurd. Described from the Caucasus.

39. **A. flavescens** Bess. Enum. pl. Volhyn. (1822) 56; Shmal'g., Fl. II, 494. — A. albidum Ldb. Fl. Ross. IV (1853) 181 (pp.); Krylov, Fl. Zap. Sib. III (1929) 621. — Exs.: HFR No. 1496 (sub A. albido).

Perennial; bulbs in clusters of several, attached to a horizontal rhizome, conical, 0.5–0.75 cm thick; tunics blackish, subcoriaceous, more or less entire; scape 10–30 cm long, slender, erect, often flexuous, slightly ribbed; leaves 6–8, filiform, semicylindric, canaliculate, 0.5–0.75 mm broad, rough-margined, slightly less than half or half the length of scape; spathe half as long as the umbel, short-acuminate, persistent; umbel fasciculate-hemispherical or hemispherical, densely many-flowered; pedicels equal, 2–3–(4) times as long as perianth, ebracteolate; segments of the hemispherical perianth yellowish, obscurely nerved, 3–4 mm long, oblong-lanceolate to oblong, subentire, dull, the inner slightly longer than to one-fourth as long again as the scaphoid outer segments; filaments equaling to slightly exceeding the perianth, at base connate and adnate to perianth, entire, subulate, the inner half as broad again as the outer; style exserted; capsule slightly shorter than perianth. June-July. (Plate X, Figure 1a).

Steppes and slopes. — European part: V.-Ka. (S.), M. Dnp., V.-Don, Transv., Bl., L. Don; W. Siberia: U. Tob., Irt. Endemic (?). Described from S. Russia.

40. **A. Stellerianum** Willd. Sp. pl. II (1799) 82; Ldb. Fl. Ross. IV (1853) 181 (quoad var. α.).

Perennial; bulbs in a cluster of several, attached to a horizontal rhizome, narrowly conical, 0.5–1 cm thick; tunics brownish or blackish, membranous to subcoriaceous, more or less entire; scape 10–30 cm long, slender, erect, slightly ribbed; leaves 4–6, approximate at scape base, semicylindric, canaliculate, 0.75–1.5 mm broad, rough-margined, slightly

shorter than scape; spathe two-thirds as long as the umbel, short-acuminate, persistent; umbel spherical, rarely hemispherical, rather few-flowered, dense, often subcapitate; pedicels equal, slightly exceeding
166 or half as long again (to twice as long) as the perianth, ebracteolate; segments of the hemispherical perianth yellow, sometimes rose-tinged, obscurely nerved, (4)–5 mm long, broadly elliptic to ovate, obtuse, entire, the inner slightly longer than the scaphoid outer segments; filaments slightly exceeding to half as long again as the perianth segments, at base connate and adnate to perianth, entire, subulate, the inner half as broad again as the outer; style exserted; capsule slightly shorter than perianth. July-August.

Slopes. — W. Siberia: Alt. (?); E. Siberia: Ang.-Say. **Gen. distr.**: Mongolia. Described from Yenisei.

41. **A. prostratum** Trev. Ind. sem. h. Wratislaw. (1821); Ej. All. (1822) 16; Ldb. Fl. Ross. IV, 182; Turcz. in Bull. Soc. Nat. Mosc. XXVII 2 (1854) 125. — Ic.: Trev. in Acta Acad. Leop.-Car. XII 1 (1826) t. XI.

Perennial; bulbs paired (?), attached to a horizontal rhizome, cylindric, 0.5–0.75 cm thick; tunics brownish, subcoriaceous, more or less entire; scape slender, weak, ascending, slightly ribbed, 10–25 cm long; leaves 5–8, approximate at scape base, semicylindric, canaliculate, 0.75–1.5 mm broad, rough-margined, shorter than scape; spathe one-third to one-half as long as the umbel, short-acuminate, persistent; umbel hemispherical to subspherical, rather loosely few-flowered; pedicels equal, 2–3 times as long as perianth, ebracteolate; segments of the subhemispherical perianth rosy-violet, obscurely nerved, ca. 5 mm long, oblong or rarely oblong-ovate, obtuse, the more or less crenate inner segments slightly longer than the scaphoid outer ones; filaments equaling or rarely barely exceeding the perianth segments, at base connate and adnate to perianth, entire, subulate, the inner half as broad again as the outer; style exserted; capsule equaling the perianth. July.

Stony places. — E. Siberia: Lena-Kol., Ang.-Say. (E.), Dau. **Gen. distr.**: Mongolia. Described from that part of Siberia adjacent to Lake Baikal.

Note. Plants from the Lena-Kolyma region deserve further study. They often have conspicuously exserted stamens and, as far as can be deduced from herbarium specimens, the flowers are sometimes yellow-tinged.

42. **A. rubens** Schrad. ex Willd. Enum. pl. Hort. Ber. I (1809) 360. — A. Stellerianum Ldb. Fl. Ross. IV (1853) 181 (quoad var. β); Kryl., Fl. Zap. Sib. III (1929) 620. — Ic.: Ldb. Ic. pl. Fl. Ross. IV (1833) t. 384.

169 Perennial; bulbs in a cluster of several, attached to a horizontal rhizome, narrowly conical, 0.5–1 mm [?] thick; tunics brownish, subcoriaceous, more or less entire; scape 10–25 cm long, slender, erect, slightly ribbed; leaves 5 or 6, approximate at scape base, semicylindric, canaliculate, 1–1.5–(2) mm broad, more or less rough-margined, about equaling the scape; spathe short-acuminate, one-half to two-thirds as long as the umbel, persistent; umbel hemispherical to spherical, rather few-flowered, loose; pedicels equal, 2–(3) times as long as perianth, ebracteolate; segments of the broadly campanulate to subhemispherical perianth rosy-violet, obscurely nerved, (4)–5 mm long, broadly elliptic

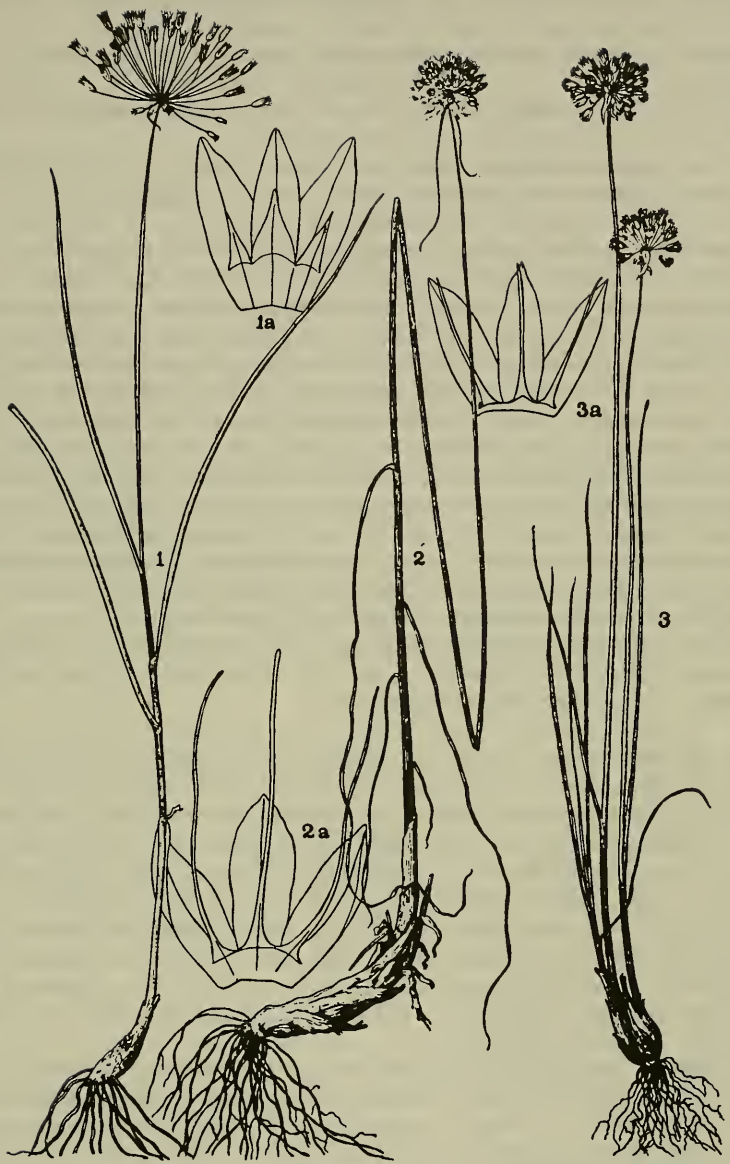

Plate XI

1. Allium dolichomischum Vved., 1a) portion of perianth.— 2. A. talassicum Rgl., 2a) portion of perianth.— 3. A. Maximowiczii Rgl., 3a) portion of perianth.

to ovate, obtuse, subentire, the scaphoid outer segments slightly shorter; filaments equaling to twice the length of perianth segments, at base connate and adnate to perianth, entire, subulate, subequal; style not exserted; capsule slightly shorter than perianth. June-August.

Rocks and stony slopes. — European part: V.-Ka. (S. Urals); W. Siberia: Ob (SE), U. Tob., Irt., Alt.; E. Siberia: Ang.-Say. (W.); Centr. Asia: Dzu.-Tarb. Gen. distr.: Mong. Described without indication of provenience.

43. **A. tytthocephalum** Roem. et Schult. Syst. VII 2 (1830) 1133. — A. senescens var. brevipedunculatum Rgl. in A.H.P. III (1875) 140; Kryl., Fl. Zap. Sib. III (1929) 618.

Perennial; bulbs solitary or paired, attached to a horizontal or ascending rhizome, narrowly conical to subcylindric, 0.5–0.75 cm thick; tunics blackish, membranous, more or less entire; scape 15–25 cm long, ribbed, in upper part anticipital; leaves 2–4, approximate at scape base, semicylindric, canaliculate, 1–2 mm broad, rough-margined, slightly shorter than the scape; spathe short-acuminate, two-thirds as long as the umbel, persistent; umbel hemispherical, rather few-flowered, dense; pedicels equal, slightly shorter to slightly longer than perianth, ebracteolate; segments of the broadly campanulate perianth purple, obscurely nerved, 5–6 mm long, ovate to broadly elliptic, obtuse, the scaphoid outer segments one-fourth as long again as the inner; filaments purple, slightly exceeding the perianth segments, at base connate and adnate to perianth, entire, subulate, subequal; style exserted; capsule two-thirds as long as perianth. August. (Plate X, Figure 2a).

Gravelly slopes in the alpine zone. — W. Siberia: Alt. (Lake Balyktykol', Saaskandy River); E. Siberia: Ang.-Say. (Sayans (?), Khati-gol River). Endemic. Described from Siberia.

44. **A. senescens** L. Sp. pl. (1753) 299; Ldb. Fl. Ross. IV, 180; Turcz. in Bull. Soc. Nat. Mosc. XXVII 2 (1854) 124; Kryl., Fl. Zap. Sib. III
170 (1929) 617; Kom., Opred. rast. Dal'nevost. kraya I (1931) 365. — A. montanum Schmidt. Fl. Boem. VI (1794) 28. — A. baicalense Willd. Enum. hort. Berol. I (1809) 360. — A. spirale Willd. Ibid. Suppl. (1813) 17. — A. glaucum Schrad. Cat. hort. Goett. (1814). — A. Andersonii Don. Mon. (1826) 59. — A. spurium Don. l.c. — A. fallax Roem. et Schult. Syst. VII, 2 (1870) 1072; Shmal'g., Fl. II (1897) 494. — A. angulosum var. minus Ldb. Fl. Ross. IV (1853) 180. — Ic.: Gmel. Fl. Sib. I (1747) t. 11, f. 2. — Exs.: HFR No. 1342; Karo Pl. Amur. Zeaën. No. 179.

Perennial; bulbs (1)–2–3, attached to a horizontal rhizome, conical 1–1.5–(2) cm thick; tunics blackish, membranous, more or less entire; scape (20)–30–60 cm long, in upper part ancipital or even narrowly winged; leaves 5–8, approximate at scape base, flat, linear, obtuse, glaucescent, the outer (2)–3–6–(10) mm broad, smooth, erect or falcate or obliquely spiral, half as long as to slightly exceeding the scape; spathe short-acuminate, (one third or) half as long as the umbel, persistent; umbel hemispherical or rarely spherical, densely many-flowered; pedicels equal, 2–3–(4) times as long as perianth, subtended by few bracteoles or ebracteolate; segments of the hemispherical perianth rose or dark rose or rosy-violet, faintly nerved, (4)–5–(6) mm long, obtuse,

oblong-lanceolate to ovate, the inner slightly longer than to one-fourth as long again as the scaphoid outer segments; filaments at the very base connate and adnate to perianth, slightly exceeding to half as long again as the perianth, entire, subulate, the inner $2\frac{1}{2}$ times as broad as the outer; style exserted; capsule equaling the perianth, the valves obcordate. May-July.

Stony and sandy places, and meadows. — European part: U. Dnp., M. Dnp., V.-Don (E.) (?); Caucasus (??); W. Siberia: Alt; E. Siberia: Lena-Kol. (S.), Ang.-Say., Dau; Far East: Ze.-Bu., Uss.; Centr. Asia: Dzu.-Tarb. (Tarbagatai). Gen. distr.: W. Europe, Mongolia, Manchuria. Described from Siberia and from Sicily.

Note. The species is differentiated into four races. The European race, named A. montanum (= A. fallax), with erect leaves (2)-3-(4) mm broad, ancipital (wingless) scape, and usually oblong-lanceolate slightly tapering inner perianth segments. Altai-Sayan race, more stocky, with leaves half the length of scape and commonly ovate rosy-violet perianth segments; Transbaikal race, the typical (A. senescens s.s. = A. baicalense); stronger plants with falcately recurved leaves 5-10 mm broad, scape often narrowly winged at summit, and commonly oblong-lanceolate perianth segments. Far Eastern form, apparently corresponding to A. spirale and A. glaucum, with obliquely spiral leaves about the length of the usually narrow-winged scape, and ovate perianth segments.

171 The insufficiently definite morphological determination of these races and, more important, the extensive and complicated synonymy, due to the lack of precise indication of origin in the short descriptions, make it impossible to consider these races as independent entities.

45. **A. nutans** L. Sp. pl. (1753) 299; Ldb. Fl. Ross. IV, 180; Kryl., Fl. Zap. Sib. III (1929) 616. — Ic.: Bot. Mag. (1808) t. 1143.

Perennial; bulbs solitary or paired, attached to a horizontal or slightly ascending stout rhizome, conical, 1.5-2 cm thick; tunics blackish, membranous, more or less entire; scape (20) 30-60 cm long, stout, with 2 usually winged ribs in upper part; leaves 6-8, approximate at scape base, flat, glaucous, obtuse, subfalcate, smooth, the outer (5)-8-15 mm broad, half the length of the scape; spathe short-acuminate, two-thirds as long as the umbel, persistent; umbel spherical, rarely subspherical, densely many-flowered to subcapitate, drooping before flowering; pedicels equal, half as long again to twice as long as the perianth, bracteolate; segments of the hemispherical perianth rose to rosy-violet, obscurely nerved, (4)-5-(6) mm long, obtuse, oblong-ovate, the inner segments somewhat longer than the scaphoid outer ones; filaments at base connate and adnate to perianth, half as long again to twice as long as perianth; capsule equaling the perianth. June-July.

Steppes and meadow and stony slopes. — W. Siberia: Ob (SE), U. Tob., Irt., Alt.; E. Siberia: Ang.-Say (W.); Centr. Asia: Dzu.-Tarb. (Saur Range). Endemic. Described from Siberia.

46. **A. pumilum** Vved. in Bull. Univ. As. Centr. 19 (1934) 121.

Perennial; bulbs 1-3, attached to a horizontal rhizome, mostly conical, ca. 0.5 cm thick, 2-3 cm long; tunics grayish, coarsely reticulate-fibrous; scape ca. 10 cm long, covered at base with smooth leaf sheaths; leaves

2 or 3, narrowly linear, 1–2 mm broad, flat or at base slightly canaliculate, subfalcately recurved, smooth, shorter than scape; spathe acuminate, equaling the umbel, persistent; umbel few-flowered, capitate; pedicels half as long as to rarely slightly shorter than perianth, ebracteolate; segments of the broadly campanulate perianth rosy, ca. 4 mm long, oblong-elliptic, obtuse, the outer slightly shorter than the inner; filaments about as long as perianth segments, at base connate and adnate to perianth, entire, triangular-subulate, subequal; style not exserted. July.

Dry slopes. — W. Siberia: Alt. (Collected by B.K. Shishkin on a single occasion in 1931 on the Ukok Plateau). Type in Leningrad.

172 47. **A. polyrrhizum** Turcz. ex Rgl. in A.H.P. III (1875) 162.

Perennial; roots numerous, almost rosy; bulbs in a cluster of several, attached to a horizontal rhizome, forming together with sterile bulbs a dense clump, subcylindric, ca. 0.5 cm thick; tunics blackish-brown, separated into subreticulate fibers; scape 10–20 cm long, slender, erect, slightly ribbed; leaves 2 or 3, filiform, 0.5–0.75 mm broad, semicylindric, canaliculate, rough-margined, approximate at scape base, exceeding half the length of scape; spathe half as long as the umbel, short-acuminate, persistent; umbel fasciculate or often hemispherical, rather few-flowered, dense; pedicels equal or half as long again (or even twice as long) as perianth, ebracteolate; segments of the broadly campanulate perianth rose, obscurely nerved, 4–5 mm long, obtuse, oblong-elliptic, the inner slightly longer than the outer; filaments equaling to slightly exceeding the perianth segments, at base connate and adnate to perianth, the outer subulate from a somewhat enlarged base, the inner twice as broad, toothed at base, rarely nearly entire; style exserted; capsule slightly shorter than perianth. August. (Plate X, Figure 3 a).

Solonetz sites. — E. Siberia: Dau.; Centr. Asia: Dzu.-Tarb. (Tarbagatai). **Gen. distr.**: Mong. Described from the Argun River. Type in Leningrad.

Note. The variety collected in Tarbagatai (Tasbeit-kuduk — Ters-airuk), var. Przewalskii Rgl. in A.H.P. III (1875) 162, et X (1887) 339, t. IV, f. 1, is distinguished by larger flowers (6 mm long), larger umbels, the inner filaments dilated nearly to the middle, and the more numerous, rufescent or rufous bulb tunics. Further study of this variety is needed.

48. **A. bidentatum** Fisch. ex Prokh. in Mater. izuch. Mong... 2 (1929) 83 in adn. et. in Bull. Jard. Bot. Princ. URSS. XXIX (1930) 564, t. V. — A. tenuissimum Turcz. in Bull. Soc. Nat. Mosc. XXVII 2 (1854) 126 (excl. syn.). — A. omiostema Airy-Shaw in Notes Bot. Gard. Edinb. XVI (1931) 144. — Ic.: Prokh., l.c. — Exs.: Karo. Pl. daur. No. 120 (sub A. tenuissimo).

Perennial; roots numerous, almost rosy; bulbs in a cluster of several; attached to a horizontal rhizome, forming together with sterile bulbs a fairly dense clump, subcylindric, ca. 0.5 cm thick; tunics brownish, subcoriaceous, laciniate; scape 10–25 cm long, slender, erect, ribbed; leaves 3, approximate at scape base, semicylindric, canaliculate, 1–1.5 mm thick, rough-margined, slightly shorter than the scape; spathe half as long as the umbel, short-acuminate, persistent; umbel

173 hemispherical, rarely subspherical, densely few-flowered; pedicels equaling to half as long again as perianth, ebracteolate; segments of the broadly campanulate perianth dark rose, obscurely nerved, 5–6 mm long, the inner oblong-elliptic to sublinear-oblong, obtuse, subtruncate, one-fourth as long again as the oblong obtuse outer segments; filaments slightly shorter than perianth segments, at the very base connate and adnate to perianth, the outer subulate, the inner twice as broad, 2-toothed at 2/3–3/4 their length; style not exserted; capsule two-thirds as long as perianth. June-August.

Gravelly and stony slopes.— E. Siberia: Ang.-Say., Dau.; Far East: Uss. (advent.); Centr. Asia: Dzu.-Tarb. (Tarbagatai). **Gen. distr.**: Mong. Described from Transbaikalia. Type in Leningrad.

49. A. **bellulum** Prokh. in Bull. Jard. Bot. Princ. URSS XXIX (1930) 568. t. VI.

Perennial; roots numerous, almost ropy; bulbs in a cluster of several, attached to a horizontal rhizome, together with sterile bulbs forming a rather dense clump, subcylindric, ca. 0.5 cm thick; tunics brownish, laciniate; scape 7–20 cm long, slender, erect, ribbed; leaves 2, filiform, canaliculate, rough-margined, slightly shorter than scape; spathe one-third as long as the umbel, short-acuminate, persistent; umbel hemispherical, loosely few-flowered, the flowers subpendulous; pedicels equal (half as long again or) twice as long as perianth, slender, ebracteolate; segments of the broadly campanulate perianth dark rose, 3.5–4.5 mm long, obtuse, ovate, the inner segments slightly longer than the outer; filaments equaling the perianth segments, at base connate and adnate to perianth, the outer subulate, the inner twice as broad, toothed at 2/3 their length; style not exserted; capsule slightly shorter than perianth. July.

Stony slopes— W. Siberia: Alt. (Bukhtarma River valley). **Gen. distr.**: Mong. Described from the Turgen River valley. Type in Leningrad.

Note. Closely related to A. bidentatum and in need of further study.

50. A. **tenuissimum** L. Sp. pl. (1753) 301; Ldb. Fl. Ross. IV, 183; Kryl., Fl. Zap. Sib. III (1929) 623.— Ic.: Ldb. Ic. pl. Fl. Ross. IV (1833) t. 358.— Exs.: HFR No. 1389.

Perennial; bulbs in a cluster of several, attached to a horizontal rhizome, narrowly cylindric-conical, obsolescent; tunics blackish or brownish, submembranous, slightly split to subentire; scape 5–25 cm long, slender, erect, terete, ribbed; leaves 2 or 3, filiform, 0.5–1 mm broad, semicylindric, canaliculate, smooth or scabrous, slightly shorter than to
174 equaling to scape; spathe short-acuminate, one-third to one-half as long as the umbel, persistent; umbel hemispherical, loosely few-flowered; flowers nodding; pedicels equal, $1\frac{1}{2}$–2–(3) times as long as perianth, ebracteolate; segments of the hemispherical perianth whitish or rosy, ca. 4 mm long, truncate or very obtuse, the inner obcuneate, the outer slightly shorter, suborbicular-elliptic; filaments about two-thirds as long as perianth segments, at base connate and adnate to perianth, entire, subulate from an enlarged base, the inner twice as broad, subtriangular; style not exserted; capsule slightly shorter than perianth. June-July.

Rocks, stony and gravelly slopes.— W. Siberia: Alt.; E. Siberia: Ang.-Say. Endemic (?). Described from Siberia.

51. **A. anisopodium** Ldb. Fl. Ross. IV (1853) 183; Turcz. in Bull. Soc. Nat. Mosc. XXVII 2 (1854) 126; Kryl., Fl. Zap. Sib.III (1929) 622; Kom., Opred. rast. Dal'nevost. kraya I (1931) 366.— Ic,: Kom. l.c. t.112, f.II.

Perennial; bulbs in a cluster of several, attached to a horizontal or ascending rhizome, narrowly cylindric-conical, obsolescent; tunics blackish-brown or brownish, more or less split, sometimes nearly separated into fibers; scape 20–40 cm long, slender, erect, terete; leaves 2 or 3, semicylindric, canaliculate, ca. 1 mm broad, smooth, slightly shorter than scape; spathe short-acuminate, one-third to one-half as long as the umbel, persistent; umbel fasciculate or fasciculately spherical, rather many-flowered, loose; pedicels unequal, 3–7 times as long as perianth, ebracteolate, the outer somewhat ascending; segments of the broadly campanulate perianth rosy, obscurely nerved, 3.5–4.5 mm long, obtuse or truncate, the inner obcuneate or linear-obcuneate, the outer oblong-elliptic to broadly elliptic, slightly shorter than the inner ones; filaments two-thirds as long as perianth, at base connate and adnate to perianth, entire, subulate from dilated base, the inner twice as broad, subtriangular; style barely exserted; capsule slightly shorter than perianth. June-July.

Dry slopes and sands.— W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau; Far East: Ze.-Bu., Uss.; Centr. Asia: Balkh. (NE). **Gen. distr.**: Mong., Jap.-Ch. Described from Tranbaikalia. Type in Leningrad.

52. **A. caespitosum** Sievers ex Bong. et Mey. in Bull. scient. Acad. Petersb. VIII (1841) 341; Ldb. Fl. Ross. IV, 183; Kryl., Fl. Zap. Sib. III (1929) 622.— Ic.: Bong. et Mey. in Mém. Acad. Pétersb. VI, ser. IV, 228 (1845) t.XVI.

Perennial, loosely cespitose by rhizomes to 10 cm long; bulbs
175 obsolescent; tunics light grayish-brown, membranous, split, the inner ones white; scape 15–20 cm long, terete; leaves 4–6, approximate at scape base, semicylindric, canaliculate, ca. 1 mm broad, smooth, shorter than scape; spathe half as long as the umbel, short-acuminate, persistent; umbel hemispherical, rather loosely few-flowered; flowers nodding; pedicels about as long or half as long again as perianth, ebracteolate; segments of the broadly campanulate perianth whitish, sometimes rose-tinged, 6–7 mm long, obtuse, the inner broadly elliptic, slightly longer than the ovate outer segments; filaments two-thirds to three-quarters as long as perianth, at base connate and adnate to perianth, entire, the outer subulate, the inner about 3 times as broad, subulate from a triangular base to narrowly triangular; style not exserted; capsule slightly shorter than perianth. June-August

Sands.— Centr. Asia: Balkh. (Irtysh, Kurtu). **Gen. distr.**: Dzu.-Kash. (?). Described from Piketnaya rybalka [marked-off fishing-ground] on the Irtysh River. Type in Leningrad.

53. **A. obliquum** L. Sp. pl. (1753) 296; Ldb. Fl. Ross. IV, 173; Shmal'g., Fl. II, 492; Kryl., Fl. Zap. Sib. III (1929) 614.— Ic.: Redouté Lil. VII (1913) t. 364.— Exs.: Schultz. Herb. norm. nov. ser. No. 2390.

Perennial; bulb solitary, attached to a vertical rhizome, oblong-ovoid, 2–3 cm thick; tunics coriaceous, reddish-brown; scape robust, 60–100–(150) cm long, covered up to the middle with smooth leaf sheaths;

leaves 6–9, linear, 5–20 mm broad, gradually attenuate toward apex, flat, subobtuse, smooth-margined, much shorter than scape; spathe short-acuminate, slightly shorter than the umbel; umbel spherical, densely many-flowered; pedicels subequal, 2–3 times the length of perianth, bracteolate; segments of the ovoid-campanulate perianth greenish-yellow, 4–5 mm long, ovate, acutish to obtuse, the scaphoid outer segments shorter than the inner; filaments half as long again as perianth segments, subulate, subequal; style conspicuously exserted. April-July.

Meadows and wooded slopes. — European part: Transv., L. Don (?)*; W. Siberia: Ob. (SE), U. Tob., Alt; E. Siberia: Ang.-Say. (W.); Centr. Asia: Dzu.-Tarb., T.Sh. (Fergana Range). Gen. distr.: Centr. Eur., Dzu.-Kash. Described from Siberia.

54. **A. platyspathum** Schrenk. Enum. pl. nov. I (1841) 7; Ldb. Fl. Ross. IV 184; Kryl. Fl. Zap. Sib. III (1929) 614. — A. amblyophyllum Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 510. — A. alataviense Rgl. in Bull. Soc. Nat. Mosc. XLI, I (1862) 448. — Ic.: Rgl. Fl. Turk. (1876) t. XII, f. 4–6.

Perennial; bulbs 1–(2.3), attached to a vertical rhizome, subcylindric, 1–2 cm thick, the inner tunics white, the outer blackish-brown, papery;
176 scape 10–70 cm long, covered at base or up to half its length with smooth sheaths; leaves 2–6, linear; 3–17 mm broad, flat, obtuse, smooth or rarely rough-margined, equaling or slightly exceeding the scape; spathe short-acuminate, sometimes colored, slightly shorter than the umbel, persistent; umbel hemispherical to spherical, densely many-flowered; pedicels equal, as long to half as long again as perianth, ebracteolate; segments of the broadly campanulate perianth rose, obscurely nerved, lustrous, 6–8 mm long, subequal, lanceolate to linear-lanceolate, subobtuse to subacute; filaments slightly shorter than to half as long again as perianth segments, at base connate and adnate to perianth, equal, entire, subulate from a somewhat dilated base; style conspicuously exserted; capsule two-thirds as long as perianth. June-July.

Alpine and subalpine zones. — W. Siberia: Alt.; Centr. Asia: Dzu.-Tarb., Pam.-Al. (Pamirs, Alai and Trans-Alai ranges), T. Sh. (Central Tien Shan, Aleksandrovskii Range, Talass Ala Tau). Gen. distr.: Dzu.-Kash. Described from Dzhilkaragai Alps. Type in Leningrad.

55. **A. polyphyllum** Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 509; Ldb. Fl. Ross. IV, 174. — Ic.: Rgl. Fl. turk. (1876) t. XII, f. 1–3. — Exs.: Herb. Fl. As. Med. No. 338.

Perennial; bulbs solitary or paired, attached to a vertical or obliquely ascending rhizome, broadly cylindric-conical, 1.5–2.5 cm thick; tunics brown, coriaceous, entire, dull; scape robust, 20–60 cm long, covered to 1/4–1/2 its length with smooth leaf sheaths; leaves 5–7, broadly linear, 3.5–15 mm broad, flat, obtuse, commonly falcately recurved, nearly smooth-margined, shorter than scape; spathe short-acuminate, equaling the umbel, sometimes colored; umbel spherical, rarely hemispherical, densely many-flowered; pedicels equal, as long to twice as long as perianth, ebracteolate; segments of the ovoid-campanulate perianth rose, obscurely nerved, 5–8 mm long, obtuse, the outer oblong to oblong-ovate, three-quarters as long as to slightly shorter than the obovate to oblong-obovate inner segments; filaments half as long again to twice as long as perianth segments, at base connate and adnate to perianth, entire, subulate from

* Novocherkassk, Pabo — needs confirmation.

a dilated base, the inner twice as broad as the outer; style conspicuously exserted; capsule about two-thirds as long as perianth. July-August.

Gravelly and stony slopes in the subalpine and alpine zones. — Centr. Asia: Dzu.-Tarb., Pam.-Al., T.Sh. **Gen. distr.**: Dzu.-Kash. Described from Dzungarian Ala Tau, Sarkhan River. Type in Leningrad.

56. A. **hymenorrhizum** Ldb. Fl. Alt. II (1830); 12; Ldb. Fl. Ross. IV, 184; Boiss. Fl. Or. V (1884) 248; Kryl., Fl. Zap. Sib. III (1929) 615. —
177 A. macrorhizum Boiss. Diagn. pl. or. nov. I, 13 (1853) 32. — Ic.: Ldb. lc. pl. Fl. Ross. IV (1833) tab. 359. — Exs.: Herb. Fl. As. Med. No. 58.

Perennial; bulbs 1 to several, attached to a rhizome and forming a rather loose clump, (1)-1.5-2 cm thick; tunics numerous, coriaceous, brown, lustrous, splitting; scape 30-90 cm long, covered nearly to the middle with smooth distant sheaths; leaves 4-6, linear, 2-5 mm broad, flattish, commonly strict, smooth, slightly shorter than scape; spathe short-acuminate, slightly shorter than to equaling the umbel, persistent; umbel spherical or hemispherical, densely many-flowered; pedicels equal, $1\frac{1}{2}$-2-(3) times the length of perianth, ebracteolate; segments of the campanulate perianth rose, obscurely nerved, 4-6 mm long, obtusish to acutish, the outer lanceolate to oblong-lanceolate, slightly shorter than the oblong to oblong-elliptic inner ones; filaments half as long again to twice as long as the perianth segments, at base connate and adnate to perianth, entire, subulate, subequal; style conspicuously exserted; capsule as long as perianth. July-August.

Meadows. — W. Siberia: U. Tob. (Iryndyk), Alt.; Centr. Asia: Dzu.-Tarb., Pam.-Al., T.Sh. **Gen. distr.**: Iran., Dzu.-Kash. Described from the Koksu and Uba rivers in Altai. Type in Leningrad.

57. **A. kashchianum** Rgl. in A.H.P. X (1887) 338 tab. III t. 2.

Perennial; bulbs 1 to several, attached to a rhizome, forming a loose clump, subcylindric, 1-1.5 cm thick; tunics coriaceous, dark brown, laciniate; scape 15-40 cm long, covered to 1/3-1/2 with smooth leaf sheaths; leaves 4 or 5, narrowly linear, 1-3 mm broad, flattish, rough-margined, slightly shorter to slightly longer than scape; spathe short-acuminate, equaling the umbel, persistent; umbel spherical or hemispherical, relatively few-flowered, dense, subcapitate; pedicels equal, two-thirds as long as to equaling perianth, ebracteolate; segments of the campanulate perianth pale rose-lilac, with a prominent darker nerve, ca. 5 mm long, obtusish, the outer oblong-lanceolate, slightly shorter than the inner oblong-elliptic segments; filaments half as long again as perianth segments, at base connate and adnate to perianth, entire, subulate, subequal; style conspicuously exserted; capsule as long as perianth. July-September.

Meadow-steppe mountain slopes. — Centr. Asia: T. Sh. (Centr. Tien Shan, rare). **Gen. distr.**: Dzu.-Kash. Described from Kash and Kegen rivers. Type in Leningrad.

58. **A. glaciale** Vved. in Bull. Univer. As. Centr. 19 (1934) 121.
178 Perennial; bulb solitary, attached to an ascending rhizome bearing vestiges of old bulbs, conical, 0.75-1 cm thick, 2-3 cm long; tunics

yellowish-brown, coriaceous, entire or sometimes somewhat separated into fibers; scape 20–30 cm long, stoutish, terete, smooth, scarcely ribbed, covered to one-third its length or nearly to the middle with smooth distant leaf sheaths; leaves 3 or 4, linear, 2–3 mm broad, flat, smooth- or scaberulous-margined, apparently shorter than scape; spathe short-acuminate, as long as or somewhat longer than the umbel, persistent; umbel spherical, densely many-flowered, capitate; pedicels equal, as long as to slightly longer than perianth, ebracteolate; segments of the campanulate perianth rose, with a prominent purple nerve, ca. 4 mm long, linear-oblong, very obtuse, the outer slightly shorter than the inner; filaments slightly exceeding the perianth, at base connate and adnate to perianth, entire, subulate, the inner somewhat broader; style exserted. July.

Centr. Asia: Pam.-Al. Found on a single occasion by Drobov in Turkestan Range on the southern rocky slopes toward the Zeravshan Glacier. Endemic. Type in Tashkent.

59. **A. setifolium** Schrenk. Enum. pl. nov. I (1841) 6; Ldb. Fl. Ross. IV, 172. — Ic.: Rgl. Fl. Turk. (1876) t. XI, f. 1–3.

Perennial; bulbs commonly numerous, attached to a rhizome, forming a compact clump, elongate-ovoid or often subcylindric, 0.5–0.75 cm thick, 2–3 cm long; tunics coriaceous, yellowish-brown, entire, splitting at the top; scape slender, 5–10 cm long, covered at base with smooth leaf sheaths, leaves 2, capillary, smooth, about equaling the scape; spathe acuminate, small, persistent; umbel several times as long as the spathe, fasciculate, loosely few-flowered; pedicels subequal, as long to twice as long as the perianth, bracteolate; segments of the campanulate perianth rose, with a darker nerve, 6–7 mm long, subequal, linear-lanceolate, obtusish; filaments two-thirds as long as perianth segments, connate and adnate to perianth for half their length, entire, subulate from slightly dilated base, subequal; style not exserted; capsule two-thirds as long as perianth. June-July.

Stony places in foothills. — Centr. Asia: Dzu.-Tarb. (Dzungarian Ala Tau), T. Sh. (Trans-Ili Ala Tau, Chu-Ili Mountains). Gen. distr.: Dzu.-Kash. Described from Labasa. Type in Leningrad.

60. **A. subtilissimum** Ldb. Fl. Alt. II (1830) 22; Ej: Fl. Ross. IV, 173; Kryl., Fl. Zap. Sib. III (1929) 612. — Ic.: Ldb. Ic. pl. Fl. Ross. IV (1833) t. 360.

Perennial; bulbs elongate-conical, 0.75–1 cm thick, clustered, forming
179 readily disintegrating clumps; tunics coriaceous, grayish-brown; scape 5–20 cm long, slender, erect; leaves 3 or 4, filiform, ca. 0.5 mm broad, semicylindric, canaliculate, rough-margined, slightly shorter to slightly longer than scape; spathe small, half as long as the umbel, persistent, the beak as long as the blade; umbel fasciculate or hemispherical, very loosely few-flowered; pedicels equal, 2–3 times as long as perianth, bracteolate, the outer ascending; segments of the substellate perianth rosy-purple, with a darker nerve, ca. 4 mm long, elliptic, obtuse, equal, the outer involute; filaments purple, slightly longer than perianth segments, at base connate and adnate to perianth, entire, subulate, equal; style longer than perianth; capsule scarcely shorter than perianth. July-August.

Solonetz soils and stony slopes. — W. Siberia: Irt.; Centr. Asia: Balkh., Dzu.-Tarb. Gen. distr.: Mong. Described from the Irtysh River. Type in Leningrad.

Note. Reports for Ural'sk and for Pamir-Alai are erroneous.

61. A. jucundum Vved. in Bull. Univer. As. Centr. 19 (1934) 122. —

Perennial; bulbs apparently several, attached to a short rhizome, cylindric-conical, 0.5–1 cm thick; tunics brown, subcoriaceous, more or less entire; scape 10–15 cm long, covered at base with smooth leaf sheaths; leaves 2 or 3, narrowly linear, 1–1.5 mm broad, flat, smooth, about as long as the scape; spathe persistent, slightly shorter than the umbel, not colored, beakless; umbel hemispherical, loosely few-flowered; pedicels equal, as long as or slightly longer than perianth, ebracteolate or subtended by few bracts; segments of the campanulate perianth purple, with a darker nerve, ca. 5 mm long, oblong, obtusish, subequal; filaments one-fourth to one-half as long again as perianth segments, at base connate and adnate to perianth, purple, subulate, entire, equal; style exserted. July.

Rocks. — Centr. Asia: T.Sh. (Centr. Tien Shan). Endemic. Described from Ulakhol. Type in Leningrad.

Note. Related to a certain extent to species of the high-mountain group A. globosum s. l., but differing from all of them in the beakless spathe and the flat leaves. Also related, though perhaps more distantly, to A. Pevtzovi Prokh., from which its differs in the longer stamens and the general flower structure characteristic of the A. globosum group.

62. A. tytthanthum Vved. in Bull. Univer. As. Centr. 19 (1934) 122.

Perennial; bulbs in a cluster of several, attached to a short rhizome; ovoid-conical to elongate-conical, ca. 1 mm thick; tunics brown,
180 coriaceous, entire; scape 10–15 cm long, covered at base or nearly to the middle with smooth leaf sheaths; leaves 3 or 4, filiform, 0.5–1 mm broad, canaliculate, scabrous, apparently shorter than scape; spathe persistent, half as long as the umbel, the beak short or sometimes up to half the length of blade; umbel fasciculately spherical, loosely few-flowered; pedicels equal, ($1\frac{1}{2}$) 2 times the length of perianth, slender, bracteolate; flowers nodding; segments of the hemispherical perianth pale yellow turning rosy, ca. 3 mm long, elliptic, obtuse, the inner mucronulate, slightly shorter than the outer; filaments half as long again as perianth, at base connate and adnate to perianth, subulate, entire, equal; style exserted. July.

Rocks and stony slopes in the middle mountain zone. — Centr. Asia: Pam.-Al. (Chul'bair mountains). Endemic. Described from Chul'bair mountains: Khodzha-barku. Type in Tashkent.

Note. Collected at two points situated very close to one another, in Chul'bair mountains. A species differing from all the other species of the A. globosum s.l. group in the loose umbel with pendulous flowers.

63. A. kokanicum Rgl. in A.H.P. III (1875) 104. — Ic.: Rgl. Fl. Turk, (1876) t.X, f. 4–6.

Perennial; bulbs in a cluster of several, attached to a short rhizome, cylindric-conical, 0.75–1.5 cm thick; tunics brown, coriaceous, more or less entire; scape 5–20–(40) cm long, covered at base with smooth leaf sheaths; leaves 2–4, filiform, canaliculate, 0.5–1 mm broad, hispid;

spathe persistent, as long as or slightly longer than the umbel, the beak as long to twice as long as the blade; umbel hemispherical or spherical, commonly many-flowered, dense; pedicels equal, shorter than to equaling the perianth, bracteolate; segments of the campanulate perianth rose, with a purple nerve, 4–5 mm long, subacute, subequal; filaments one-fourth to one-half as long again as perianth segments, at base connate and adnate to perianth, more or less purple, the outer subulate, the inner half as broad again, 2-toothed at base; style exserted; capsule slightly shorter than the perianth. July-August.

Stony and rocky slopes in the upper mountain zone. — Centr. Asia: Dzu. Tarb. (Dzungarian Ala Tau), Pam.-Al. (Alai Range), T. Sh. (Aleksandrovskii Range, Fergana Range). Endemic. Described from Alai Range. Type in Leningrad.

Note. A species with unusual distribution. Related to A. caricoides from which it differs in the toothed filaments of the inner stamens.

64. **A. filifolium** Rgl., A.H.P. X (1887) 352, t. VI, f. 3.

Perennial; bulbs in a cluster of several, attached to a short rhizome, elongate-conical to subcylindric, 0.5–1 cm thick; tunics brown, coriaceous,
181 more or less entire; scape 10–20 cm long, covered at base with smooth leaf sheaths; leaves 2 or 3, filiform to subcapillary, 0.25–0.5 (1) mm broad, canaliculate, smooth or scaberulous-margined, slightly shorter than the scape; spathe persistent, slightly exceeding the umbel, usually colored, the beak shorter than to as long as the blade; umbel hemispherical, rarely spherical, densely few-flowered; pedicels equal, half as long to half as long again as perianth, bracteolate; segments of the campanulate perianth rose, with a purple nerve, (4)–5 mm long, oblong, acutish, subequal; filaments half as long again to twice as long as the perianth segments, at base connate and adnate to perianth, entire, equal, subulate, usually faintly colored; style exserted; capsule slightly shorter than perianth. July-August.

Gravelly and stony slopes in the upper mountain zone. — Centr. Asia: Pam.-Al., T. Sh. Endemic. Described from Talass Ala Tau: Bish-tash. Type in Leningrad.

Note. The Talass Ala Tau and the Aleksandrovskii Range are inhabited by typical A. filifolium, with subcapillary smooth leaves. In the remaining parts of the distribution area (Tashkent Ala Tau, Pamir-Alai) one often comes across specimens with broader scabrous leaves and thus resembling A. caricoides Rgl.

There is need for further collecting of alliums of the A. globosum s.l. group in the high mountains of Central Asia, as the material from very interesting parts of their distribution area is often inadequate.

65. **A. caricoides** Rgl. in A.H.P. VI (1880) 532. — A. Hoeltzeri Rgl. A.H.P. VIII (1884) et in Gartenfl. (1884) 291. t. 1169. — Ic.: Rgl. in A.H.P. X (1887) t. X, f. 4–6.

Perennial; bulbs in a cluster of several, attached to a short rhizome, cylindric-conical, 0.5–1 cm thick; tunics brown, coriaceous, more or less entire; scape 5–20 cm long, covered at base with smooth leaf sheaths; leaves 3 or 4, filiform, 0.5–1 mm broad, canaliculate, with ciliate-scabrous margin, commonly exceeding the scape; spathe persistent, slightly shorter to slightly longer than the umbel, colored, the beak slightly shorter to

slightly longer than the blade; pedicels equal, half the length of perianth, bracteolate; segments of the campanulate perianth pale rose, with a purple nerve, 4–4.5 mm long, oblong, acute, subequal; filaments half as long again as the perianth, at base connate and adnate to perianth, entire, subulate, more or less purple; style exserted; capsule slightly shorter than perianth. June-September.

Gravelly slopes in the middle and upper mountain zones. — Centr. Asia: T. Sh. (Centr. Tien Shan). Endemic (?). Described from Trans-Ili Ala Tau: Malaya Alamaatinka. Type in Leningrad.

182 Note. Known from a few localities in Central Tien Shan and requiring further study. Appears to be intermediate between A. filifolium Rgl. and A. tianschanicum Rupr.

66. **A. tianschanicum** Rupr. in Mém. Acad. Pétersb. VII, XIV, 4 (1869) 33. — A. hymenorrhizum var. tianschanicum Rgl. in A.H.P. III (1875) 132. — A. macrorrhizum Rgl. in A.H.P. III (1875) 154. — A. globosum var. albidum Rgl. in A.H.P. X (1887) 352. — Ic.: Rgl. Fl. Turk. (1876) t. XIII, f. 12–14.

Perennial; bulbs in a cluster of several, attached to a short rhizome, cylindric-conical to subcylindric, (0.75)–1–2 cm thick, (5)–10–15 cm long; tunics brown, coriaceous, more or less splitting; scape 15–25 cm long, covered at base with smooth leaf sheaths; leaves 3 or 4, narrowly linear, 1–1.5 mm broad, canaliculate, ciliate-scabrous, commonly shorter than the scape; spathe persistent, slightly exceeding the umbel, the beak about as long as the blade; umbel hemispherical to subspherical, rather many-flowered, dense; pedicels equal, slightly shorter to slightly longer than perianth, bracteolate; segments of the subspherical perianth yellowish or whitish turning red, 5–6 mm long, ovate, obtuse, the outer sometimes emarginate, 1/6 shorter than the inner; filaments one-fourth to one-half as long again as perianth segments, at base connate and adnate to perianth, subulate, entire, equal; style exserted; capsule scarcely shorter than the perianth. July-September.

Stony and rocky slopes in the middle mountain zone. — Centr. Asia: Pam.-Al. (Alai Range, Pamirs), T. Sh. (Centr. Tien Shan). Gen. distr.: Dzu.-Kash. Described from Dzhaman-daban. Type in Leningrad.

Note. The herbarium material suggests that the Pamir and some Tien Shan specimens have yellow-tinged flowers. The plants which the author collected himself in the Terskei Ala Tau have flowers without any yellow tinge.

67. **A. condensatum** Turcz. in Bull. Soc. Nat. Mosc. XXVII, 2 (1855) 121. — Kom., Opred. rast. Dal'nevost. kraya I (1931) 365. — A. Steveni var. ε Ldb. Fl. Ross. IV (1853) 177.

Perennial; bulbs solitary (or paired), attached to a short rhizome, cylindric-conical, 1–2 cm thick; tunics brown, often lustrous, subcoriaceous, more or less entire; scape 30–80 cm long, covered at base or up to 1/4 their length with smooth leaf sheaths; leaves 4–7, semicylindric, canaliculate, fistulous, 1–2.5 mm broad, smooth, shorter than the scape; spathe persistent, about equaling the umbel, the beak sometimes as long as the blade; umbel spherical or nearly so, densely many-flowered; pedicels equal, $(1\frac{1}{2})$–2–3–(4) times as long as the perianth,

bracteolate; segments of the ovoid-campanulate perianth pale yellow, with a greenish nerve, 4–5 mm long, ovate, obtusish, the outer slightly shorter
183 than the inner; filaments half as long again as the perianth, at base connate and adnate to perianth; capsule slightly shorter than perianth. July-September.

Conglomerates and rocks. — E. Siberia: Dau.; Far East: Ze.-Bu., Uss. **Gen. distr.**: Mong., Jap.-Ch. Described from Dauria. Type in Leningrad.

68. **A. petraeum** Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 512. — A. Steveni var. δLdb., Fl. Ross. IV (1853) 177.

Perennial; bulbs 1–3, attached to a short rhizome, elongate-conical to subcylindric, 0.75–1–1.5 cm thick; tunics grayish, the inner ones often violet, coriaceous to subchartaceous, splitting; scape (20)–30–50 cm long, covered to 1/4–1/3 with scabrous or smooth leaf sheaths; leaves 4 or 5, 0.5–1 mm broad, canaliculate, commonly smooth, slightly shorter than the scape; spathe persistent, 2–4 times as long as the umbel, the beak several times the length of the blade; umbel spherical, densely many-flowered; pedicels equal, half as long again as the perianth, bracteolate; segments of the ovoid-campanulate perianth pale yellow, with a greenish or rarely dingy green nerve, ca. 4 mm long, oblong-ovate, obtuse, mucronulate, the outer slightly shorter than the inner; filaments half as long again to twice as long as the perianth, at base connate and adnate to perianth, entire, subulate, equal; style exserted; capsule slightly exceeding the perianth. July.

Stony slopes in foothills. — Centr. Asia: Balkh., Dzu.-Tarb., T. Sh. (Chu-Ili Mountains). Endemic. Described from the Dzungarian Ala Tau: Lepsa. Type in Leningrad.

69. A. **talassicum** Rgl. in A.H.P. V (1878) 628.

Perennial; bulbs 1–3, attached to a short rhizome, cylindric-conical, 0.75–1.5 mm thick; tunics brown, coriaceous, nearly entire; scape (15)-30–75 cm long, covered to 1/3 or nearly to the middle with smooth leaf sheaths; leaves 3–7, narrowly linear to filiform, 0.5–1.5–(2) mm broad, canaliculate, smooth or rough-margined; spathe persistent, half as long again to 3 times as long as the umbel, the beak $1\frac{1}{2}$–5 times the length of the blade; umbel spherical or hemispherical, commonly many-flowered, dense; pedicels equal, (1.5)–2–3 times as long as the perianth, bracteolate; segments of the ovoid perianth pale yellowish-green, turning rosy, oblong-lanceolate, acute, 3–4 mm long, the outer slightly shorter than the inner; filaments half as long again as the perianth, at base connate and adnate to perianth, entire, subulate, equal; style exserted; capsule slightly longer than the perianth. July-August. (Plate XI, Figure 2 a).

184 Rocky and stony slopes in the middle mountain zone. — Centr. Asia: T. Sh. Endemic. Described from Talas, Kara-choku. Type in Leningrad.

70. A. **Marschalianum** Vved. nom. nov. — A. saxatile MB. Fl. taur.-cauc. I (1808) 264, Suppl. (1819) 260 (non MB. 1798 et auct. fl. Taur.). — A. Steven. var. γ Ldb. Fl. Ross. IV (1854) 177. — A. globosum var. ochroleucum Boiss. Fl. Or. V (1884) 248 (quoad pl. taur.). — A. globosum var. saxatile Shmal'g., Fl. II (1897) 493 (p. p.). — Ic.: MB. Cent. pl. rar. (1810) t. 29.

Perennial; bulbs in a cluster of several, attached to a short rhizome, elongate-conical, 0.75–1.5 cm thick; tunics brown, coriaceous, splitting; scape 10–35 cm long, covered at base of up to 1/4 with smooth leaf sheaths; leaves 3 or 4, filiform, 0.5–1 mm broad, canaliculate, smooth or scabrous, slightly shorter than to equaling the scape; spathe persistent, half as long again to 3 times as long as the umbel, the beak usually several times the length of the blade; umbel spherical or hemispherical, dense, commonly many-flowered; pedicels equal, as long as to twice as long as perianth, bracteolate; segments of the ovoid-campanulate perianth white or very faintly rosy, sometimes very faintly yellow in drying, 4–5 mm long, oblong-ovate, acute, the outer slightly shorter than the inner; filaments half as long again to twice as long as perianth segments, at base connate and adnate to perianth, entire, subulate, equal; anthers commonly yellow; style exserted; capsule barely shorter than the perianth. July-August.

Rocks, stony places, and mountain slopes. — European part: Crim. Endemic (?). Described from the Crimea. Type in Leningrad.

Note. Closely related to A. saxatile M.B., with which it was at first confused by Bieberstein himself. In considering it as a distant species, in conformity with present practice (c.f. Wolf. Fl. Kryma, 3, 34), the author was obliged to give it a new name, although he is not convinved as to the characteristics distinguishing it from A. saxatile M.B. or from A. szurulense Lerchenf. (if one regards the latter as distinct from A. saxatile).

71. **A. saxatile** M.B. Tabl. prov. casp. (1798) 114. — A. savranicum Bess. Cat. Hort. Crem. Suppl. (1818) (n.v.). — A. caucasicum MB. Fl. taur.-cauc. Suppl. (1819) 258. — A. Steveni var. β Ldb. Fl. Ross. IV (1853) 177. — A. globosum Boiss. Fl. Or. I (1884) 247 (p.p.). — A. Ruprechtii Boiss. Fl. Or. V (1884) 264 (?). — A. globosum var. saxatile Shmal'g., Fl. II (1897) 493 (p.p.). — A. globosum f. dilute-roseum Kryl., Fl. Zap. Sib. III (1929) 632. — Exs.: Pl. or. exs. No. 130 (sub A. globoso).

Perennial; bulbs in a cluster of several, attached to a short rhizome, ovoid-conical to elongate-conical, 0.75–1 cm thick; tunics brown, coriaceous, splitting; scape 20–50 cm long, covered at base or up to 1/4–(1/3) with smooth or scabrous leaf sheaths; leaves 5–7, filiform, 0.5–1 mm broad, canaliculate, smooth or scabrous, shorter than the scape; spathe persistent, half as long again to 3 times as long as the umbel,
185 the beak usually several times as long as the blade; umbel hemispherical or spherical, commonly many-flowered, dense; pedicels equal, as long as or often half as long again to twice as long as the perianth, bracteolate; segments of the ovoid-campanulate perianth pale rose, darker on the back, 4–5–(6) mm long, oblong, acute, the outer slightly shorter than the inner; filaments half as long again to twice as long as perianth segments, at base connate and adnate to perianth, entire, equal, subulate; anthers commonly violet; style exserted; capsule barely shorter than the perianth. July-August.

Rocks, stony places, sands, and steppes. — European part: M. Dnp., Bl., Crim., L. Don (W.); Caucasus: Cisc., Dag., W. and E. Transc.; Centr. Asia: Balkh. (NE part), Dzu.-Tarb. **Gen. distr.**: Centr. Eur., Dzu.-Kash. Described from E. Transcaucasia: Kurt-bulak.

Note. The differences of habitat between the Ukrainian (sands and steppes) and the Caucasian plants (rocks and stony slopes), as well as the marked isolation of the Dzungarian-Tarbagatai distribution area, suggest the existence of different races, but it has not been possible to arrive at a definite conclusion with herbarium material alone. Also worthy of attention is the high-mountain Caucasian form with larger flowers.

72. **A. globosum** M. B. ex Redouté Lil. III (1807) t. 179; Boiss. Fl. Or. V (1884) 247 (p. p.); Shmal'g., Fl. II. 493 (p. p.); Krylov, Fl. Zap. Sib. III (1929) 631. — A. caucasicum Ker.-Gawl. Bot. Mag. XXVIII (1808) in adn. ad tab. 1143. (?). — A. Steveni var. *α* Ldb. Fl. Ross. IV (1853) 176. — A. Gmelinianum Miscz. ex Gross., Fl. Kavk. I (1928) 269. — Exs.: HFR No. 536.

Perennial; bulbs commonly in a cluster of several, attached to a short rhizome, ovoid-conical to elongate-conical, 0.75–1.5 cm thick; tunics brown, coriaceous, splitting; scape 20–60 cm long, covered to 1/4–1/3 with smooth leaf sheaths; leaves 5 or 6, subulate, 0.5 mm broad, canaliculate, smooth or rarely scabrous, shorter than the scape; spathe persistent; commonly 2–3 (4) times as long as the umbel, the beak usually several times as long as the blade; umbel commonly spherical, rarely hemispherical, dense; pedicels equal, half as long again to twice as long as perianth, bracteolate; segments of the ovoid-campanulate perianth dark rose to nearly purple, with a darker nerve, 4–4.5 mm long, oblong-ovate acute, the outer barely shorter than the inner; filaments half as long again to twice as long as perianth segments, at base connate and adnate to perianth, entire, subulate, equal; anthers violet; style exserted; capsule as long as the perianth. June-August.

Stony slopes, chalk, limestone, and solonetz soils. — European part:
186 V.-Ka., V.-Don, Transv., Crim. (?), L. Don, L. V.; Caucasus: Cisc.; W. Siberia: U. Tob., Irt.; Centr. Asia: Balkh. (NE). Endemic. Described from the Caucasus.

73. **A. Alexandrae** Vved. in Not. Syst. Herb. Horti Bot. Petrop. V (1924) 95.

Perennial; bulbs in clusters of several, attached to an oblique rhizome, elongate-ovoid to subcylindric, 0.75–1.5 cm thick, 2–6 cm long; tunics coriaceous, entire, split only at the top, parallel-nerved; scape (10)–20–30 cm long, covered to the middle with smooth or scabrous leaf sheaths; leaves 4 or 5, filiform, ca. 0.5 mm broad, semicylindric, canaliculate, sulcate, smooth or scabrous, usually shorter than the scape; spathe small, long-beaked, sometimes up to 3 times as long as the umbel, persistent; umbel hemispherical, densely few-flowered; pedicels subequal, half as long to as long or (in fruit) twice as long as the perianth, bracteolate; segments of the campanulate perianth rose, with a purple nerve, 4–5 mm long, obtuse, the inner oblong-elliptic, slightly longer and much broader than the oblong-lanceolate outer segments; filaments barely shorter than perianth segments, connate and adnate to perianth for 1/4 their length, the outer oblong-subulate, the inner 3 times as broad, abruptly attenuate at 3/4 their length, sometimes nearly toothed; style not exserted; capsule slightly shorter than the perianth. July-August.

Steppe slopes. — Centr. Asia: T. Sh. (Centr. Tien Shan). Endemic. Described from several localities in Central Tien Shan. Type in Leningrad.

74. A. **teretifolium** Rgl. in A.H.P. V (1878) 629. — A. Grimmii Rgl. in Trautv., Rgl. Maxim. et Winkl. Dec. pl. nov. (1882) 10.

Perennial; bulbs 2 to several, attached to a short rhizome, elongate-ovoid, 1–1.5 cm thick; tunics brown or rufous-brown, coriaceous, reticulate-nerved, the outer reticulately fibrous, enveloping the scape base; scape 15–50 cm long, covered to 1/4 or up to the middle with smooth leaf sheaths; leaves 3 or 4, filiform, ca. 0.5 mm broad, canaliculate, sulcate, smooth, shorter than the scape; scape with beak as long again as the blade, equaling or slightly exceeding the umbel, persistent; umbel fasciculate or often fasciculate-hemispherical, commonly many-flowered, bracteolate; segments of the campanulate perianth rose, with a purple nerve, 6–9 mm long, subequal, lanceolate, acutish; filaments two-thirds as long as perianth segments, connate and adnate to perianth for 1/5 their length, commonly entire, the outer triangular-subulate, the inner 3 times as broad at base, triangular; style not exserted; capsule half as long as the perianth. July-August.

187 Gravelly slopes. — Centr. Asia: Dzu.-Tarb. (Dzungarian Ala Tau), T. Sh. (Ketmen). **Gen. distr.**: Dzu.-Kash. Described from Dzungarian Ala Tau: Altyn-imel'.

75. A. **Korolkovii** Rgl. in A.H.P. III (1875) 158. — A. oliganthum var. elongatum Kar. et Kir. in Bull. Soc. Nat, Mosc. XV (1842) 511. — A. moschatum var. dubium et var. brevipeduncula tum Rgl. A.H.P. VI (1880) 522, 523. — A. oliganthum auct. fl. As. Med. — Ic.: Rgl. Fl. turk. (1876) t. 13–15.

Perennial; bulbs 2 to several, attached to a short rhizome, oblong-ovoid, 0.75–1 (1.5) cm thick; tunics coriaceous, brown, often lustrous, densely subreticulately nerved, clasping the scape base and there slightly reticulate-fibrous; scape slender, 10–20–(45) cm long, covered at base or up to 1/3 with smooth leaf sheaths; leaves 2–4, filiform, ca. 0.5 mm broad, sulcate, canaliculate, smooth or rarely scabrous, much shorter than the scape; spathe somewhat shorter than the umbel, persistent, the beak short or sometimes up to one-half the length of blade; umbel fasciculate or hemispherical, commonly few-flowered; pedicels more or less unequal, slightly shorter than to twice the length of perianth, bracteolate; segments of the campanulate perianth nearly white, in drying rose with purple nerve, 5–8 mm long, subequal, lanceolate to oblong-lanceolate, acutish or sometimes short-acuminate; filaments two-thirds as long as perianth segments, connate and adnate to perianth for one-fourth their length, commonly entire, abruptly subulate from a triangular base, the inner about twice as broad at base as the outer; style not exserted; capsule half as long as the perianth. July-August.

Dry steppe slopes. — Centr. Asia: Dzu.-Tarb. (Dzungarian Ala Tau), Pam.-Al. (Irkeshtam), T. Sh. (Centr. Tien Shan). **Gen. distr.**: Dzu.-Kash. Described from the mountains between the Malyi Naryn and Ulan rivers. Type in Leningrad.

76. **A. Albovianum** Vved. nom. nov. — A. gracile Albov. in Tr. Tifl. Bot. Sada I (1895) 239, non Ait. (1789).

Perennial; bulbs 2 or 3, attached to a rhizome, narrowly conical, ca. 0.75 cm thick; tunics brownish, coriaceous, separated into fibers, obscurely reticulate-fibrous; scape 20–30 cm long, ribbed, covered at base with subapproximate smooth leaf sheaths; leaves 3–5, narrowly linear, ca. 2 mm broad, stoutish, canaliculate, smooth or minutely scaberulous-margined, slightly shorter than the umbel, persistent; umbel hemispherical, rather few-flowered, dense; pedicels equal, about as long as perianth, dark rose, obscurely nerved, 5–6 mm long, elliptic, obtuse, the outer slightly shorter than the inner; filaments dark rose, half
188 as long again as the perianth, at base connate and adnate to perianth, entire, subulate, equal; style scarcely exserted. July.

Alpine pastures. — Caucasus: W. Transc. Endemic. Described from the town of Dzhvari.

77. A. **gunibicum** Miscz. ex Grossh., Fl. Kavk. I (1928) 208.

Perennial; bulbs in a cluster of several, attached to a short rhizome, ovoid-conical to elongate-conical, 0.5–0.75 cm thick, (1)–2–7 cm long; tunics brown, coriaceous, splitting, obscurely reticulate-fibrous; scape 10–20 cm long, slender, covered at base with smooth approximate leaf sheaths; leaves 3 or 4, semicylindric, canaliculate, smooth, 0.5–1 mm broad, about as long as the scape; spathe persistent, somewhat shorter than the umbel, the beak as long as or slightly shorter than the blade; umbel fasciculately hemispherical or hemispherical, few-flowered, loose; pedicels equal, half as long again to twice as long as the perianth, subtended by few bracteoles; segments of the hemispherical perianth rosy-purple, ca. 5 mm long, elliptic, obtuse; filaments rose, half as long again as the perianth segments, at base connate and adnate to perianth, entire, subulate, equal; style exserted; capsule slightly shorter than the perianth. August.

Rocks and stony slopes, at 1,300–2,000 m. — Caucasus: Dag. Endemic. Described from Gunib. Type in Leningrad.

Note. A plant collected by A. Poretskii on limestone near village of Gimry, at the altitude of about 700 m, approaches closely this species, but its perianth segments are only ca. 4 mm long, narrower, and mucronate.

A. gunibicum is closely related to A. Albovianum. The differences between the two are not quite clear to the author, who knows the latter species only from cultivated specimens.

78. **A. daghestanicum** Grossh. in Fl. Kavk. I (1928) 208.

Perennial; bulbs ovoid-lanceolate, attached to a rhizome; tunics gray, slightly reticulate-fibrous; leaves shorter than the scape, thick; flat, canaliculate, 4–5 mm broad; spathe subulate-tipped, shorter than the pedicels; umbel loosely few-flowered; pedicels unequal, 4–6 times the length of flower; perianth segments rose, 5–7 mm long, acute, ovate-lanceolate, the outer lanceolate; filaments half as long again as the perianth segments; anthers dark; style slightly longer than the ovary.

High-mountain zone. — Caucasus: Dag. Endemic. Type in Tiflis [Tbilisi].

79. **A. Veschnjakovii** Rgl. in A.H.P. VI (1880) 531. — Ic.: Rgl. in A.H.P. X (1887) t. VIII, f. 3.

189 Perennial; roots numerous, nearly ropy; bulbs in a cluster of several, attached to a horizontal rhizome, obsolescent; tunics grayish-brown, membranous, more or less entire; scape 10–15 cm long, slender, erect, ribbed; leaves 2 or 3, subulate, 0.5–1 mm broad, semicylindric, canaliculate, smooth, slightly shorter than the scape; spathe short-acuminate, one-third to one-half as long as the umbel, persistent; umbel fasciculate; few-flowered, fairly loose; pedicels equal, half as long again to twice as long as the perianth, ebracteolate; segments of the campanulate perianth rosy-violet, with a prominent dingy violet nerve, 5–6 mm long, oblong-elliptic, obtuse, the outer slightly shorter than the inner; filaments two-thirds to three-quarters as long as perianth segments, adnate to perianth for half its length, connate to 3/4, the outer subulate in free part, the inner narrowly triangular; style not exserted; capsule about half as long as the perianth. June-July.

Pebbles and gravelly and stony slopes in the alpine zone. — Centr. Asia: T. Sh. (Centr. Tien Shan). **Gen. distr.**: Dzu.-Kash. Described from the Kegan River. Type in Leningrad.

80. **A. Semenovi** Rgl. in Bull. Soc. Nat. Mosc. XLI, 1 (1868) 449. — Ic.: Rgl. Fl. turk. (1876) t. VIII, 4–5.

Perennial; bulbs 1 to several, attached to a rhizome, cylindric, obsolescent, 0.75–1 cm thick; tunics brownish, subreticulate-fibrous; scape stoutish, 10–40 cm long, covered to the middle or nearly so with smooth subapproximate leaf sheaths; leaves (2) 3, broadly linear, 5–15 mm broad, gradually attenuate toward apex, not fistulous, smooth, slightly longer than the scape; spathe short-acuminate, about as long as the umbel, commonly colored, persistent; umbel spherical-ovoid, rather many-flowered, dense, capitate; pedicels unequal, the inner several times as long as the outer, slightly shorter than to equaling the perianth, ebracteolate; segments of the campanulate perianth yellow, at length turning reddish, 10–15 mm long, unequal, the outer half as long again as the inner, lanceolate to oblong-lanceolate, tapering, acute, more or less crenate; filaments one-fourth to one-third the length of outer perianth segments, adnate to perianth for half their length, connate to 3/4, in free part triangular-subulate, the inner twice as broad as the outer, commonly toothed; style not exserted, with 3 stigmas, sometimes parted nearly down to base. June-July.

Alpine meadows. — Centr. Asia: Dzu.-Tarb. (Dzungarian Ala Tau), T. Sh. **Gen. distr.**: Dzu.-Kash. Described from several locations in Central Tien Shan. Type in Leningrad.

81. **A. monadelphum** Less. ex Kunth Enum. IV (1843) 393; Ldb. Fl. Ross. IV, 168; Turcz. in Bull. Soc. Nat. Mosc. XXVII, 2 (1854) 120. —
190 A. atrosanguineum Schrenk. Bull. Acad. Pétersb. X (1842) 355; Ldb. Fl. Ross. IV, 168. — A. atrosanguineum Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 508. — A. Fedtschenkoanum Rgl. in A.H.P. III (1875) 82. — A. Kaufmanni Rgl. in A.H.P. III (1875) 84. — Ic.: Rgl. Fl. Turk. (1876) t. VIII, f. 1–3.

Perennial; bulbs solitary or clustered, attached to a rhizome, cylindric, obsolescent, 0.5–1 cm thick; tunics brownish, more or less fibrous; scape stoutish, 10–60–(100) cm long, covered to 1/5–1/2 with smooth leaf

sheaths; leaves 1–2–(3), cylindric, fistulous, 2–7 mm broad, smooth, slightly shorter to slightly longer than the scape; spathe short-acuminate, as long as or slightly shorter than the umbel, usually colored, persistent; umbel spherical-ovoid, densely few-flowered, often capitate; pedicels unequal, the inner longer than the outer, 1/3–1/2 as long as to equaling the perianth or the inner ones in fruit to twice as long as the perianth, ebracteolate; segments of the campanulate perianth lustrous, yellow or finally reddish or dark purple, 7–14 mm long, equal or the outer up to half as long again as the inner, lanceolate, oblong-lanceolate or oblong, often tapering, obtuse or acute, the margin entire or more or less crenate; filaments one-thirds to one-half as long as perianth segments, adnate to the perianth to the middle, connate to 2/3–3/4 their length, in free part triangular-subulate, the inner ones half as broad again as the outer, sometimes 2-toothed; style not exserted, with 3 stigmas, sometimes 3-fid for 2/3 its length; capsule half as long as the perianth. June-July.

Fine-textured and stony places in the subalpine and alpine zones.— W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia: Dzu.-Tarb.; Pam.-Al., T. Sh. Gen. distr.: Ind.-Him., Dzu.-Kash., Mong. Described from W. Sayans: Sabin-daban. Type in Leningrad.

Note. A. monadelphum s. l. is a highly complex and very polymorphic cycle. A reliable subdivision into elementary entities can only be achieved on the basis of field observations, particularly as regards flower color and degree of aggregation in clumps.

82. A. **schoenoprasum** L. Sp. pl. (1753) 301; Ldb. Fl. Ross. IV, 166 (excl. syn. A. oliganthum Kar. et Kir.) Turcz. in Bull. Soc. Nat. Mosc. XXVII 2 (1854) 119; Boiss. Fl. Or. V (1884) 250; Shmal'g., Fl. II, 493; Kryl., Fl. Zap. Sib. III (1929) 606; Kom., Opred. rast. Dal'nevost. kraya I (1931) 366. — A. sibiricum L. Mant. II (1771) 562. — A. Raddeanum Rgl. in A.H.P. III (1875) 155. — Ic.: Syreishch., Ill. Fl. Mosk. gub. I (1906) 235. — Exs.: HFR No. 85.

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Perennial; bulbs 1 to several, attached to a short rhizome, oblong-ovoid, to ovoid-conical, 0.75–1 cm thick; tunics brown, papery to subcoriaceous, sometimes slightly separated into parallel fibers; scape stoutish, 10–60 cm long, smooth or rarely scabrous, covered to 1/3–1/2 with smooth or rarely scabrous leaf sheaths; leaves 1 or 2, cylindric or at base semicylindric, 2–6 mm broad, fistulous, smooth or rarely scabrous, commonly shorter than the scape; spathe short-acuminate, as long as or somewhat shorter than the umbel, often colored, persistent; umbel fasciculate-spherical to subspherical, dense, subcapitate; pedicels unequal, the inner longer, one-third to one-half the length of or rarely as long as the perianth segments, ebracteolate; segments of the narrowly campanulate perianth lustrous, pale rose to rosy-violet, with a darker nerve, 7–17 mm long, linear-lanceolate, lanceolate or oblong, more or less tapering, acute to obtusish, often with reflexed tips; filaments one-third to one-half as long as perianth segments, connate and adnate to perianth for 1/4–1/3 their length, entire, tapering from a triangular base, the inner half as broad again at base as the outer; style not exserted; capsule one-third to one-half as long as the perianth. May–August.

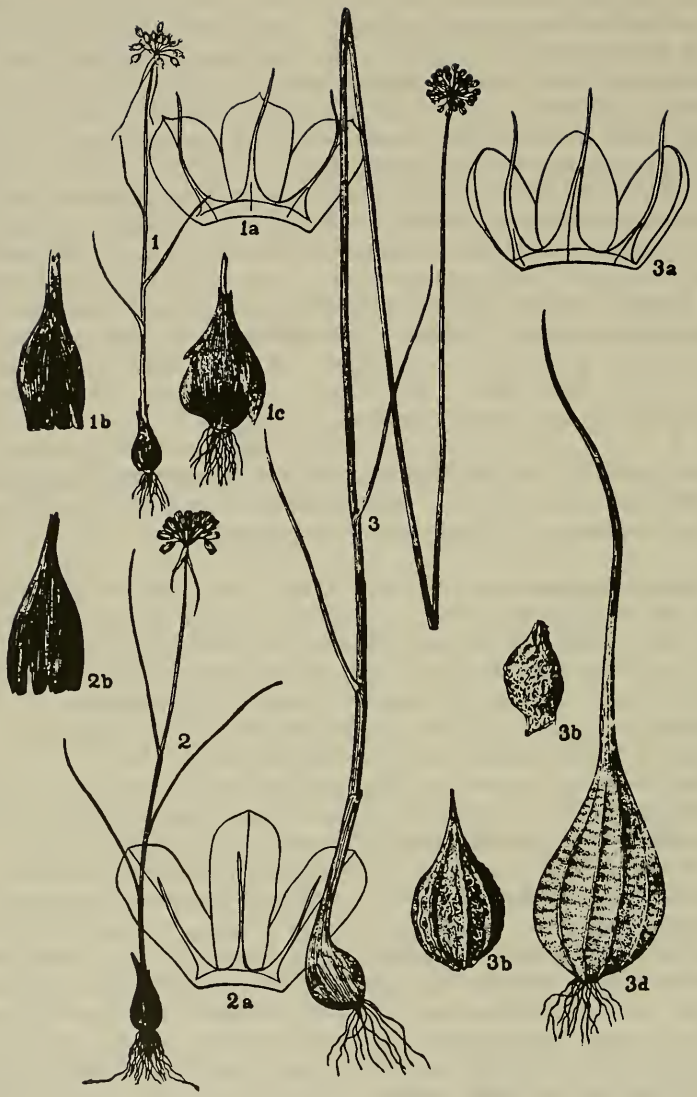

Plate XII

1. Allium pseudoflavum Vved.; 1a) portion of perianth; 1b) bulb scale; 1c) bulb.— 2. A. Kunthianum Vved.; 2a) portion of perianth; 2b) bulb scale.— 3. A. transvestiens Vved., 3a) portion of perianth, 3b), 3d) bulblets.

Meadows, river valleys, rarely stony slopes. — Arctic: Arc. Eur., Nov. Z., Arc. Sib., Chuk., An.; European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Ka., U. Dnp., M. Dnp. (rare), V.-Don, Bl. (rare), L. Don (rare); Caucasus: Cisc., Dag., W., E. and S. Transc.; W. Siberia: Ob, Irt., Alt.; E. Siberia: Yen., Lena-Kol., Ang.-Say., Dau.; Far East: Kamch., Okh., Uda, Uss.; Centr. Asia: Dzu.-Tarb., T. Sh. (Centr. Tien Shan). Gen. distr.: Scand., Centr. Eur., W. Med., Bal.-As. Min., Iran., Ind.-Him., Dzu.-Kash., Mong., Jap.-Ch., Ber., N. Am. Described from Siberia and Elandiya.

Note. A. schoenoprasum, as here presented, is a very polymorphic species. Of particular interest for further study is the strongly scabrous Central Asian race. Scabrous scapes and leaves also occur sometimes in the Caucasian A. schoenoprasum and this prompted certain Caucasian florists to identify such plants quite erroneously with A. scabrellum Boiss. et Buhse.

Economic importance. Sometimes cultivated in the western part of the European U.S.S.R. for the tender tops. In Siberia it is pickled for winter use.

194 83. A. **Ledebourianum** Roem. et Schult. Syst. VII (1830) 1029; Ldb. Fl. Ross. IV, 168; Kryl., Fl. Zap. Sib. III (1929) 607. — A. uliginosum Ldb. Ic. pl. fl. Ross. I (1829) 20, t. 83.

Perennial; bulbs 2 to several, attached to a rhizome, cylindric to elongate-ovoid, 0.75–1 cm thick; tunics grayish-brown, shelly-coriaceous, breaking up; scape stoutish, 40–80 cm long, smooth, covered up to the middle with smooth leaf sheaths; leaves 1 or 2, semicylindric (?), fistulous, 5–10 mm broad, smooth, shorter than the scape; spathe short-acuminate, one-half to two-thirds as long as the umbel, persistent; umbel fasciculate-spherical or subspherical, densely many-flowered; pedicels subequal, half as long again to 3 times as long as the perianth, ebracteolate; segments of the narrowly campanulate perianth lustrous, rosy-violet, with a darker nerve, 7–12 mm long, oblong-lanceolate to lanceolate, acute; filaments two-thirds as long as to slightly shorter than the perianth segments, at base connate, and adnate to perianth, entire, the outer triangular-subulate, the inner half as broad again at base, very narrowly triangular; style conspicuously exserted; capsule half as long as the perianth. June-July.

Meadows and river valleys. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Far East: Ze.-Bu., Uda. **Gen. distr.**: Mong. Described from Belaya Uba and Koksun rivers. Type in Leningrad.

Note. The form described by Krylov (Fl. Alt. VI (1912) 1379) as var. intermedium, is apparently a hybrid between A. Ledbourianum and A. schoenoprasum.

84. A. **Maximowiczii** Rgl. in A.H.P. III (1875) 153; Kom., Opred. rast. Dal'nevost. kraya I (1931) 366.

Perennial; bulbs in a cluster of several, attached to a rhizome, cylindric-conical, 0.75–1 cm thick; tunics reticulate, subchartaceous, brittle; scape 15–60 cm, covered at base or up to 1/3 with smooth sometimes violet-tinged leaf sheaths; leaves 1–(2), cylindric (?), fistulous, 1–5 mm broad, smooth, slightly shorter than the scape; spathe short-acuminate, slightly shorter than the umbel, persistent; umbel hemispherical to spherical, densely many-flowered; pedicels subequal,

$(1\frac{1}{2})-2-(3)$ times as long as the perianth, ebracteolate; segments of the campanulate perianth, lustrous, rose, with a darker nerve, 5–6–(7) mm long, oblong-lanceolate, acute; filaments slightly shorter to scarcely longer than perianth segments, at base connate and adnate to perianth, entire, the outer subulate from a slightly dilated base, the inner about half as broad again at base, gradually attenuate; style slightly exserted; capsule two-thirds as long as the perianth. June-July. (Plate XI, Figure 3 a).

195 Meadows and river valleys. — E. Siberia: Dau.; Far East: Okh., Ze.-Bu., Uda, Uss., Sakh. Gen. distr.: Jap.-Ch. Described from Amur and Ussuri areas. Type in Leningrad.

Note. Closely related to A. Ledebourianum. Additional studies are needed, as the differences between the two species are not quite clear.

85. A. **oliganthum** Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 856. — A. stenophyllum Schrenk. in Bull. Acad. Pétersb. III (1845) 210; Ldb. Fl. Ross. IV, 172; Kryl., Fl. Zap. Sib. III (1929) 613. — Ic.: Rgl. Fl. turk. (1876) t. IX, f. 4–6.

Perennial; bulbs several, attached to a short rhizome, elongate-ovoid, ca. 1 cm thick; tunics shelly-coriaceous, brownish or violet-brown, brittle, clasping the scape base and there more or less separated into parallel fibers; scape 15–35 cm long, covered to 1/3 or nearly to the middle with smooth leaf sheaths; leaves 1 or 2, semicylindric, fistulous (?), canaliculate, 1–2 mm broad, shorter than the scape; spathe short-acuminate, one-half to two-thirds as long as the umbel, persistent; umbel fasciculate-hemispherical to spherical, rather many-flowered, relatively loose; pedicels subequal, 2–3 times as long as the perianth, ebracteolate; segments of the campanulate perianth rose, with a darker nerve, 5–6 mm long, oblong, acute; filaments slightly shorter than perianth segments, at base connate and adnate to perianth, entire, subequal, subulate from a scarcely dilated base; style slightly exserted; capsule two-thirds as long as the perianth. June-July,

Solonetz meadows. — W. Siberia: Irt.; Centr. Asia: Balkh. (N.). Described from the area between the Ayaguz and Donzuk rivers. Type in Leningrad.

Section 4. **PHYLLODOLON** (Salisb.), Prokh. in Tr. Prikl. Bot., Gen. i Sel. XXIV (1930) 178. — Phyllodolon Salisb. Gen. Pl. Frag. (1866) 90. — Bulbs (in wild species) attached to rhizome, elongated, more or less clustered; scape robust, hollow, the aerial part covered to rather high up with leaf sheaths; leaves fistulous; pedicels ebracteolate; perianth campanulate, the segments 1-nerved; filaments entire; capsule ovoid-triangular, obscurely pitted; seeds angular.

86. A. **microbulbum** Prokh. in Bull. appl. Bot. XXIV, 2 (1930) 180.

Perennial; bulbs 1–3, attached to a short rhizome, ovoid-conical, 0.75–1.5 cm thick; tunics reddish-brown, subcoriaceous, entire; scape 20–25 cm long, 0.75–1.5 cm thick below the middle, gradually attenuate toward apex, half as long as to slightly shorter than the scape; spathe short-acuminate, as long as the umbel, persistent; umbel spherical or

196 subspherical, densely many-flowered, capitate; pedicels stout, unequal, the central ones somewhat longer, slightly shorter than or (the central) to twice as long as perianth, ebracteolate; segments of the campanulate perianth yellowish, lustrous, 6–7 mm long, acute, the inner oblong-elliptic, slightly longer than the oblong-lanceolate outer segments; filaments twice as long as perianth segments, at base connate and adnate to perianth, entire, subequal, subulate from a triangular base; style conspicuously exserted; capsule about half as long as the perianth.

E. Siberia: Dau. (known from 3 localities). A cultivated plant, according to Prokhanov. Described from Shavka River. Type in Leningrad.

87. **A. altaicum** Pall. Reise... II (1773) 737, t. R. — A. fistulosum Ldb. Fl. Ross. IV (1853) 169; Turcz. in Bull. Soc. Nat. Mosc. XXVII, 2 (1854) 120; Kryl., Fl. Zap. Sib. III (1929) 609. — Ic.: Prokhanov in Tr. Prikl. Bot. XXIV, 2 (1930) 132.

Perennial; bulbs 1 to several, attached to an oblique rhizome, oblong-ovoid, 2–4 cm thick; tunics reddish-brown, subcoriaceous, entire; scape robust, 30–70–(100) cm long, stout, 1–3 cm thick below the middle, gradually attenuate toward summit, covered to 1/3–1/2 with smooth leaf sheaths; leaves 2–4, cylindric, fistulous, 8–20 mm broad, gradually attenuate toward apex, short, one-third to one-half the length of scape; spathe short-acuminate, about as long as the umbel; umbel spherical, densely many-flowered, capitate; pedicels stout, subequal, slightly shorter than to half as long again as the perianth, ebracteolate; segments of the campanulate perianth yellowish, lustrous, 6–8 mm long, acuminate, the inner elliptic, the outer oblong-lanceolate, slightly shorter than the inner; pedicels about twice the length of perianth, at base connate and adnate to perianth, entire, subequal, subulate from a triangular base; style exserted; capsule two-thirds as long as the perianth. July-August.

Rocks and stony places. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia: Dzu.-Tarb. Gen. distr.: Dzu.-Kash., Mong. Described from the Altai.

(88). **A. fistulosum** L. Sp. pl. (1753) 301; Shmal'g., Fl. II (1897) 489. — Ic.: Prokhanov in Tr. Prikl. Bot. XXIV, 2 (1930) 133.

Perennial; bulbs oblong, sometimes obsolescent; scape to 1 m long, stout, fistulous, obliquely inflated; leaves fistulous; umbel spherical, many-flowered; pedicels slender, 2–3 times as long as perianth; segments of the campanulate perianth yellowish, oblong, acute; filaments 2–3 times as long as the perianth, entire. — A. cultivated plant.

Economic importance Extensively cultivated in the Far East and in Siberia. To the west, beyond Bashkiria, not grown on a larger scale. The Chinese in the Far East use the blanched stem bases (Japanese leek""). 197 Owing to the early development of the top, it has recently come into use in Europe as a substitute for green common onion ("winter onion").

Section 5. **CEPA** Prokh. in Bull. appl. Bot. XXIV (1930) 180. — Bulbs (in wild species) attached to a rhizome, more or less clustered, often well developed, conical to ovoid; scape robust, the aerial part covered to rather high up with leaf sheaths; leaves fistulous; pedicels bracteolate; perianth

stellate; leaves 1-nerved; filaments entire or the inner with 2 short toothlets at base; capsule applanate-globose, with broad nectaries at base.

89. **A. galanthum** Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 508; Ldb. Fl. Ross. IV, 169; Kryl., Fl. Zap. Sib. III (1929) 603.— A. pseudocepa Schrenk in Bull. Acad. Pétersb. X (1842) 355.— Ic.: Rgl. Fl. turk. (1876) t. VIII, t. 6–8.

Perennial; bulbs in a cluster of several, attached to rhizome, conical-cylindric, 1.5–2.5 cm thick; tunics reddish-brown, subcoriaceous, entire; scape robust, 20–50 cm long, solid, gradually attenuate toward summit, covered at base with smooth leaf sheaths; leaves 2–(3), cylindric, gradually attenuate toward apex, fistulous, erect, 3–10 mm broad, one-half to two-thirds as long as the scape; spathe one-half to two-thirds the length of the umbel; umbel hemispherical or often spherical, rather densely many-flowered; pedicels equal, 2–3 times as long as perianth, subtended by few bracteoles; segments of the stellate perianth white, obscurely nerved, 4–5 mm long, equal oblong, obtuse; filaments scarcely longer than perianth, at base adnate to perianth and connate to form a ring, subulate from the enlarged base, entire; style shorter than the capsule; capsule slightly longer than the perianth. July.

Gravelly and stony slopes.— W. Siberia: Irt., Alt.; Centr. Asia: Balkh., Dzu.-Tarb., T. Sh. Gen. distr.: Dzu.-Kash. Described from the Lepsa River. Type in Leningrad.

Note. Plants from Central Tien Shan deserve further study.

90. **A. pskemense** B. Fedtsch. in Bull. Jard. Bot. Pétersb. V (1905) 43.— Exs.: Herb. Fl. As. Med. No. 417, a et b.

Perennial; bulbs in a cluster of several, attached to rhizome, elongate-ovoid, 4–6 cm thick; tunics reddish-brown, subcoriaceous, entire; scape robust, 40–80 cm long, hollow, obliquely inflated below the middle, covered at base with smooth leaf sheaths; leaves 3, cylindric, attenuate toward apex, fistulous, erect, 2–3 cm thick, half as long as the scape; spathe about equaling the umbel; umbel spherical, densely many-flowered; pedicels equal, 3–4 times as long as perianth, subtended by bracteoles; segments of the stellate perianth white, obscurely nerved, ca. 6 mm long, equal,
198 oblong, obtuse; filaments slightly exceeding the perianth segments, at base connate and adnate to perianth, slightly connate in a ring higher up, the outer subulate, the inner about 3 times as broad at base as the outer and much broader than the perianth segments, subulate above the 2-toothed base; style shorter than the capsule; capsule globose-trigonous. August.

Rock crevices and stony places.— Centr. Asia: T. Sh. (Tashkent Ala Tau, Chatkal Range). Endemic. Described from the Pskem River. Type in Leningrad.

91. **A. Vavilovi** M. Pop. et Vved. in Bull. Univer. As. Centr. 19 (1934) 122.

Perennial; bulbs solitary or paired, attached to rhizome, ovoid-oblong, 2.5–4 cm thick; tunics reddish-brown, coriaceous, entire; scape robust, 70–90 cm long, hollow, inflated at 1/4–1/3 their length, covered at base with approximate smooth leaf sheaths; leaves 7–9, flattened, canaliculate, fistulous, glaucous, subdistichous, recurved, 7–15 mm broad, greatly

exceeded by the scape; spathe short-beaked, about equaling the umbel; umbel spherical, densely many-flowered; pedicels equal, 3–4 times the length of perianth, bracteolate; segments of the stellate perianth white, with a green nerve, ca. 4 mm long, linear-oblong, obtuse, equal; filaments as long as perianth segments, at base connate and adnate to perianth, the outer subulate, the inner twice as broad as the outer and slightly broader than perianth segments, subulate from a broadly ovate obtusely 2-toothed base; anthers greenish-yellow; style shorter than the capsule; capsule subglobose, ca. 4 mm in diameter. June.

Rock crevices and stony slopes. — Centr. Asia: Mtn. Turkm. Gen. distr.: N. Iran. Described from Kopet Dagh: Germab. Type in Tashkent.

92. A. **Oschanini** O. Fedtsch. in Progress. Sadov. i Ogorod. III (1906) 332.cum. tab. — A. cepa var. sylvestre Rgl. in A.H.P. X (1887) 314. — Exs.: Herb. Fl. As. Med. No. 334.

Perennial; bulbs 1–3, attached to rhizome, ovoid, 2.5–4 cm thick; tunics reddish-brown, coriaceous, entire; scape robust, 45–100 cm long, hollow, inflated below the middle, covered at base with subdistant smooth leaf sheaths; leaves 4 or 5, cylindric, attenuate toward apex, fistulous, glaucescent, erect, 4–15–(40) mm broad, one-third the length of the scape; spathe about equaling the umbel; umbel spherical, densely many-flowered; pedicels 3–4 times as long as perianth; bracteolate; segments of the stellate
199 perianth white, with a green nerve, 4–5 mm long, equal, linear-oblong to oblong-lanceolate, obtuse; filaments one-fourth as long again as perianth, at base connate and adnate to perianth, the outer subulate, the inner at base twice as broad as the outer and slightly broader than perianth segments, subulate from a broadly ovate obtusely 2-toothed base; style shorter than the capsule; capsule globose-trigonous, ca. 5 mm in diameter. June.

Rock crevices and stony slopes. — Centr. Asia: Pam. Al., T. Sh. (Mogol-tau). Endemic. Described without indication of provenience (probably from Alai Range).

(93). A. **cepa** L. Sp. pl. (1753) 300; Shmal'g., Fl. II, 489. — Ic.: Syreishch., Ill. Fl. Mosk. gub. I (1906) 236.

Perennial; bulb oblong or applanate-spherical; tunics yellowish-brown, reddish or white; scape to 1 m long, stout, inflated below the middle, fistulous; leaves fistulous; umbel spherical, densely many-flowered;; pedicels several times the length of perianth; perianth stellate, whitish-greenish, the segments oblong obtuse; filaments exceeding the perianth, the inner obtusely 2-toothed at base. A cultivated plant.

Economic importance. Cultivated throughout the Soviet Union for the preservable bulbs and tops. Grown on a large scale in the central part of the European USSR. Also widely cultivated in Transcaucasia and in Soviet Central Asia; rare in Siberia and in the Far East, where onion cultivation has penetrated only in recent times. In the north grown only as green onion.

Section 6. **HAPLOSTEMON** Boiss. Fl. Or. V (1884) 230. — Bulb solitary, spherical, ovoid or oblong-ovoid; rhizome none; aerial part of scape covered to high up with leaf sheaths; perianth segments 1-nerved; filaments entire or short-toothed; seeds angular.

94. A. **Margaritae** B. Fedtsch. in Bull. Jard. Bot. Princ. XVIII, 1 (1918) 14. — A. moschatum auct. Fl. As. Med. — Exs.: Herb. Fl. As. Med. No. 61.

Perennial; bulb ovoid, 1–1.5 cm thick; outer tunics brown or grayish-brown, coriaceous, splitting, prominently subreticulately nerved; scape 10–20 cm long, covered up to the middle with smooth leaf sheaths; leaves 3 or 4, filiform, apparently semicylindric, canaliculate, smooth, as long as the scape; spathe one-third to one-half as long as the umbel, with beak half as long as the blade, not splitting down to base, forming a short tube enveloping the umbel base; umbel without bulblets, fasciculate, loosely few-flowered; pedicels unequal, 2–4–(5) times as long as perianth, subtended by bracteoles; segments of the campanulate perianth nearly white, with a prominent dingy purple nerve, 5–6 mm long, equal, lanceolate,
200 acute; filaments two-thirds as long as the perianth, at base connate and adnate to perianth, subulate from triangular base, the inner twice as broad; anthers yellow; style not exserted; ovary subglobose, scabrous; capsule valves suborbicular, scarcely emarginate, ca. 3 mm long. June-July.

Outcrops of mottled strata. — Centr. Asia: Balkh., T. Sh. Endemic. Described from Chu River valley: Uspenskoe. Type in Leningrad.

Note. It is very likely that, as a result of more detailed study of this species, this as well as the four following species, this as well as the four following species will have to be transferred to the section Rhiziridium.

95. A. **inaequale** Janka in Linnaea, XXX (1860) 603. — A. moschatum auct. p. p. — Ic.: Fl. Yugo-Vost. I (1927) 367.

Perennial; bulb ovoid, 1–2 cm thick; outer tunics brown or grayish-brown, subcoriaceous, splitting and more or less reticulate-fibrous, especially at the top where clasping the scape base; scape 10–25 cm long, covered to 1/3 or nearly to the middle with smooth leaf sheaths; leaves 3 or 4 (5), apparently semicylindric, canaliculate, smooth or often scabrous, shorter than scape, withering before flowering; spathe one-third to one-half as long as the umbel, with beak as long as the blade, split down to base; umbel without bulblets, fasciculate, loosely few-flowered; pedicels commonly very unequal, (2)–3–6(10) times as long as the perianth, subtended by few bracteoles; segments of the campanulate perianth pale rose, with a purple nerve, 4–5–(7) mm long, equal, oblong-lanceolate, obtusish; filaments three-quarters as long as perianth segments, at base connate and adnate to perianth, the inner narrowly triangular, twice as broad as the triangular-subulate outer ones; anthers violet; style not exserted, commonly about 1.5 mm long; ovary truncate-conical, scabrous; capsule valves orbicular, scarcely emarginate, ca. 3 mm long. June-August.

Steppes slopes, limestone, chalk, and sands. — European part: V.-Don (SW), Bl., Crim. (Balaklava), L. Don, L. V.; Caucasus: Cisc. (Stavropol), Dag.* (?); Centr. Asia: Ar.-Casp. Endemic. Described from Krasnoarmeisk.

Note. The typical A. inaequale occurs beyond the Volga. The form growing to the west in the southern part of the European USSR displays characteristics of transition towards A. moschatum, although still closer to A. inaequale. This form needs a detailed supplementary study.

* Akhty, Becker — needs confirmation.

96. **A. moschatum** L. Sp. pl. (1762) 427; Ldb. Fl. Ross. IV 172 (p. p.); Boiss. Fl. Or. V (1884) 265; Shmal'g., Fl. II 490 (p. p.). — Ic.: Rchb. Ic. pl. Germ. X (1848) f. 1901. — Exs.: Fl. Hung. exs. No. 697.

Perennial; bulb oblong-ovoid, 1–1.5 cm thick; outer tunics grayish-
201 brown, subcoriaceous, splitting, reticulately nerved, at the top reticulately fibrous or reticulate and more or less clasping the scape base; scape 10–25 cm long, covered to 1/3–1/2 with smooth leaf sheaths; leaves (4)–5–6, filiform, canaliculate, more or less revolute, ciliate-scabrous on the margin, about as long as the scape, persistent nearly to fruiting; spathe commonly somewhat shorter than the umbel, with beak longer than the blade, split down to base; umbel without bulblets, fasciculate or often hemispherical, rather few-flowered; pedicels subequal, as long as to 2–(3) times as long as perianth, subtended by few bracts; segments of the campanulate perianth rose, with a purple nerve, (5)–6–7 mm long, subequal, lanceolate, obtuse; filaments about two-thirds as long as the perianth, at base connate and adnate to perianth, triangular-subulate, the inner half as broad again at base as the outer; anthers violet; style not exserted, commonly ca. 3 mm long; ovary pyriform, scabrous; capsule valves ca. 3 mm long, suborbicular, terminating in a short narrowly emarginate point. July-August.

Rocks and dry places. — European part: M. Dnp. (W.), Crim., Caucasus: Cisc., W., E. and S. Transc. **Gen. distr.**: Centr. Eur., W. Med., Bal.-As. Min. Described from France and Spain.

97. **A. callidictyon** C. A. M. ex Kunth Enum. IV (1843) 413; Ldb. Fl. Ross. IV, 173; Boiss. Fl. Or. V (1884) 266.

Perennial; bulb oblong-ovoid, 1–1.5 cm thick; outer tunics rufous, reticulate; scape 10–20 cm long, covered to 1/3 or nearly to the middle with more or less hairy smooth upper leaf sheaths; leaves 3 or 4, filiform, revolute, scabrous- or smooth-margined, shorter than the scape; spathe half as long as the umbel, with beak about as long as the blade, split down to base; umbel without bulblets, fasciculate, loosely few-flowered; pedicels unequal, one-fifth to one-third as long as perianth, subtended by bracteoles; segments of the campanulate perianth whitish, with a dingy green nerve, 6–7 mm long, equal, oblong-lanceolate, the outer acutish, the inner obtuse, filaments three-quarters the length of perianth segments, connate and adnate to perianth to 1/4 their length, the inner triangular, twice as broad as the narrowly triangular outer ones; anthers yellow; style not exserted; ovary elongate-conical, truncate, smooth. June.

Dry stony places. — Reported for E. and S. Transc. Specimens from there not seen. **Gen. distr.**: Asia Minor, Iran. Described from N. Iran. Cotype in Leningrad.

98. **A. lacerum** Freyn on Oest. Bot. Zeitschr. XLII (1892) 373 et herb. — A. laceratum Freyn in Oest. Bot. Zeitschr. XLI (1891) 60, non Boiss. et Noë (1859). — A. incisum Fom. in Monit. Jard. Bot. Tiflis. 14 (1909) 52. — A. araxanum Fom. ex Grossh., Fl. Kavk. I (1928) 211. — A. fimbriatum Schischk. in Izv. Tom. Gos. Un. 80 (1929) 432.

202 Perennial; bulb oblong-ovoid, ca. 1 cm thick; outer tunics brownish, reticulate, sometimes prolonged and clasping the scape base; scape 5–40 cm long, slender, covered up to the middle with more or less hairy leaf sheaths; leaves 3–5, semicylindric, canaliculate, fistulous, 0.5–1.5 mm broad, hirsute-margined; spathe half as long as to slightly shorter than the umbel, with a short tube enveloping the umbel base; umbel without bulblets, fasciculate, loosely few-flowered; pedicels unequal, $1\frac{1}{2}$–3–(5) times as long as perianth, subtended by bracteoles; segments of the campanulate perianth pale rose to nearly white, sometimes yellowish in drying, 6–7 mm long, equal, the outer ovate to oblong-ovate, acute or acutish, with more or less reflexed tips, entire, the inner oblong-elliptic, obtuse, the margin in upper part rather deeply lacerate; filaments one-half to two-thirds as long as perianth segments, at base connate and adnate to perianth, the inner triangular, twice as broad as the narrowly triangular outer ones; style not exserted. July.

Rocky places. — Caucasus: S. Transc. **Gen. distr.**: Asia Minor, N. Iran. Described from Asia Minor: Amaziya. Cotype in Leningrad.

99. A. **stamineum** Boiss. Diagn. pl. or. nov. II, 4 (1859) 119; Boiss. Fl. Or. V (1884) 256. — A. kossoricum var. araraticum Miscz. ex Grossh., Fl. Kavk. I (1928) 212 et in herb.

Perennial; bulbs ovoid, 1–1.5 cm thick; outer tunics grayish or blackish, papery, nearly nerveless; tunics of replacement bulb without perceptible nerves; scape 20–30 cm long, covered to (1/3)–1/2–2/3 with smooth leaf sheaths; leaves 2–(4), semicylindric, ca. 1 mm broad, smooth, sulcate, exceeding the umbel; umbel without bulblets, fasciculate or often fasciculately hemispherical, commonly many-flowered; pedicels unequal, 2–5–(9) times as long as perianth, subtended by bracteoles; segments of the campanulate perianth rose, with a dingy purple nerve, 4 mm long, elliptic-oblong, obtuse, and round-tipped, the outer scaphoid, slightly shorter than the inner; filaments one-fourth to rarely one-half as long again as the perianth segments, connate and adnate to perianth for 1/5 their length, subulate, purple; anthers yellow; ovary subsessile, globose, scabrous; style conspicuously exserted; valves orbicular, shallowly emarginate, ca. 3.5 mm long. June-July.

Mountain steppes. — Caucasus: S. Transc. **Gen. distr.**: E. Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from Asia Minor: Karia.

100. **A. kossoricum** Fom. in Monit. Jard. Bot. Tiflis 14 (1909) 50.

203 Perennial; bulb ovoid, ca. 1 cm thick; outer tunics blackish, separated into parallel fibers; scape ca. 20 cm long, covered to 1/3 with smooth leaf sheaths; leaves 3, cylindric-filiform, smooth; spathe slightly shorter than the umbel; umbel without bulblets, few-flowered, fasciculate-hemispherical; pedicels unequal, 2–5 times as long as perianth; segments of the ovoid-campanulate perianth whitish-greenish with a small violet spot and a green nerve, 3–3.5 mm long, elliptic-oblong, obtuse, round-tipped or terminating in a short-reflexed point, the outer scaphoid, slightly shorter than the inner; filaments half as long again to twice as long as the perianth segments, connate and adnate to perianth for 1/5 their length, subulate, violet; anthers yellow; ovary subsessile, globose, scabrous; style conspicuous exserted. June.

Dry stony slopes. — Caucasus: S. Transc. **Gen. distr.**: Arm.-Kurd. Described from Ol'ta, vicinity of the village of Kosor. Type in Tiflis.

Note. Reported by Grossheim (Fl. Kavk. I, 212) for various localities in Transcaucasia, but the author has not seen the plants identified by him. They are presented in the original description as having bulb tunics separated into parallel fibers, but the author has not seen bulbs from the classifical location. In all the green-flowered material of the A. stamineum s.l. group with bulbs retained which was at my disposal, the outer tunics were nerveless or faintly nerved.

A. stamineum, A. kossoricum and A. pseudoflavum, as well as other related forms of Asia Minor require further study. It is necessary for their differentiation to call in characters other than flower color which has been chiefly used in their classification.

101. **A. pseudoflavum** Vved. in Bull. Univer. As. Centr. 19 (1934) 123. — A. flavum auct. quoad pl. Transcauc. et pers. (pp.).

Perennial; bulb ovoid, 3/4–1 cm thick; outer tunics grayish or brownish, subcoriaceous, distinctly parallel-nerved; scape (10)–15–25 cm long, covered to 1/3 or rarely up to the middle with scabrous or rarely smooth leaf sheaths; leaves 4, filiform ca. 0.5 mm broad, semicylindric, sulcate, scabrous- or smooth-margined, apparently shorter than the umbel; spathe half as long again to 3 times as long as the umbel; umbel without bulblets, few-flowered, fasciculate or often fasciculate-hemispherical; pedicels unequal, $1\frac{1}{2}$–3–(5) times as long as perianth, subtended by bracteoles; segments of the ellipsoid-campanulate perianth yellow, rarely rosy-tinged, 4 mm long, elliptic-oblong, obtuse, round-tipped or often terminating in a reflexed point, the outer scaphoid, scarcely shorter than the inner; filaments one-fourth or rarely half as long again as the perianth segments,
204 connate and adnate to perianth for 1/5 the length, subulate, yellow; anthers yellow, ovary subsessile, globose, scabrous; style conspicuously exserted; capsule valves orbicular, shallowly emarginate, 2.5 mm long. June-July. (Plate XII, Figure 1 a–c).

Dry slopes. — Caucasus: E. and S. Transc., Tal. **Gen. distr.**: N. Iran. Described from Nor-bayazet, vicinity of the village of Subbotan. Type in Leningrad.

Note. Some plants from E. Transcaucasia and Talysh have rose-tinged perianth.

102. **A. pulchellum** Don. Mon. (1826) 46 (excl. syn. A. paniculatum et A. Seguierianum). — A. flavum var. pulchellum Ldb. Fl. Ross. IV (1853) 175 (p.p.). — A. carinatum var. capsuliferum Ldb. l.c. — A. flavum var. tauricum Bess. ex Rchb. Pl. crit. VI (1828) f. 776. — A. Paczoskianum Tuzs. in Bot. Közlem. XII (1913) 190, t. V, f. 1. — A. flavum auct. quoad. pl. Ross. europ. et cauc., p.p. — Ic.: Rchb. l.c., Tuzs, l.c.

Perennial; bulb ovoid, 0.75–1 ($1\frac{1}{2}$) cm thick; outer bulb tunics grayish or brownish, papery, nearly nerveless; scape (20)–30–50 cm long, covered up to the middle with smooth leaf sheaths; leaves 3 or 4, semicylindric, 1/2–1 mm broad smooth, sulcate, usually apparently somewhat shorter than the scape; spathe 2–4–(5) times as long as the umbel; umbels without bulblets, fasciculate or fasciculate-hemispherical, commonly many-flowered; pedicels very unequal, 2–10 times as long as perianth, subtended

by bracteoles; segments of the ellipsoid-campanulate perianth yellowish, more or less intensely rosy-tinged, pruinose, dull, (4)–5 mm long, elliptic-oblong, obtuse and round-tipped, the outer scaphoid, slightly shorter and broader than the inner; filaments as long half again (or twice as long) as perianth segments, connate and adnate to perianth to 1/5 their length, subulate, commonly violet; anthers light violet, with yellow pollen; style conspicuously exserted; ovary distinctly stipitate, oblong, smooth; capsule valves broadly obcordate to suborbicular, 4–5 mm long. June-July.

Dry slopes. — European part: M. Dnp., V.-Don, Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., W. and E. Transc. Gen. distr.: Bal.-As. Min. Described from Russia.

Note. The true A. flavum L. does not occur in the USSR, and all reports, except for some Transcaucasian ones, refer to this species. A. flavum flowers are yellow, without any trace of anthocyanin shades.

103. A. carinatum L. Sp. pl. (1753) 297; Ldb. Fl. Ross. IV, 174 exs. var. capsuliferum; Boiss. Fl. Or. V (1884) 255; Shmal'g., Fl. II, 488. — Ic.: Rchb. Ic. fl. Germ. X (1848) f. 1057. — Exs.: Kerner. Fl. Hung. exs. No. 3483.

Perennial; bulbs ovoid, 1–1.5 cm thick; outer tunics blackish or brownish, almost papery, slenderly parallel-nerved; scape 25–45 cm long,
205 covered up to the middle with scabrous or smooth leaf sheaths; leaves 3–(4), narrowly linear, 1–2 mm broad, more or less revolute, sulcate, scabrous or smooth, apparently as long as the scape; spathe 3 times as long as the umbel; umbel bearing bulblets, fasciculate or often fasciculate-spherical, loosely few-flowered; pedicels subequal, rose with a darker nerve, pruinose, dull, 5–6 mm long, subequal, elliptic-oblong, obtuse; filaments half as long again as perianth segments, connate and adnate to perianth to 1/5 their length, subulate, purple; anthers light violet, with yellow pollen; style conspicuously exserted; ovary oblong, short-stipitate, smooth. July-August.

Reported for many localities in the western part of former European Russia which largely do not form part of the USSR, but the plants kept under this name in herbaria are mostly A. oleraceum L. I have not seen any A. carinatum plants from USSR territory.

104. A. oleraceum L. Sp. pl. (1753) 299; Ldb. Fl. Ross. IV, 174; Shmal'g., Fl. II, 488; Kryl., Fl. Zap. Sib. III (1929) 631. — A. scabrum Gilib. Exerc. phyt. II (1792) 469. — Ic.: Syreishch., Ill. Fl. Mosk. gub. I (1906) 238.

Perennial; bulb ovoid, ca. 1 cm thick; outer tunics brownish or grayish, slenderly parallel-nerved; scape 25–50 cm long, covered to 1/3–1/2 with smooth or rarely scabrous leaf sheaths; leaves 3 or 4, narrowly linear, 1–2 mm broad, more or less revolute, smooth or scabrous, shorter than the scape; spathe 2–3 times as long as the umbel; umbel bearing bulblets, fasciculate or fasciculate-hemispherical, loosely few-flowered, very rarely flowerless, with bulblets alone; pedicels unequal, 2–4–(6) times as long as perianth, commonly recurved; segments of the narrowly campanulate perianth greenish or often rosy, 6–7 mm long, equal, linear-oblong, obtuse, round-tipped or minutely mucronulate; filaments as long as perianth segments, connate and adnate to 1/5, subulate; anthers yellow; style exserted, about half the length of capsule; capsule valves obcordate, ca. 6 mm long. June-July.

Meadows, steppes, slopes, scrub, and sometimes as weed.— European part: Lad.-Ilm., U. V.; V.-Ka., U. Dnp., M. Dnp., V.-Don, Transv., L. Don, L. V.; Caucasus: Cisc. **Gen. distr.**: W. Europe. Described from Sweden and Germany.

105. **A. paniculatum** L. Syst. nat. ed. X. II (1759) 978; Boiss. Fl. Or. V, 259 (p. p.; Shmal'g., Fl. II 489 (excl. var. rupestri).—
A. praescissum Rchb. Pl. crit. V (1827) 17, f. 618.—
A. paniculatum var. legitimum Ldb. Fl. Ross. IV (1853) 176.—
A. fuscum auct. fl. Ross.— Ic.: Rchb., l.c.— Exs.: HFR No. 535.

Perennial; bulb ovoid, 0.75–1.5 cm thick; outer tunics grayish, papery,
206 obscurely and slenderly parallel-nerved; scape (20)–30–50 cm long, covered to 2/3 with smooth leaf sheaths; leaves 3 or 4, linear, 1–2 mm broad, more or less revolute, sulcate, smooth or scabrous, at least the upper ones apparently exceeding the scape; spathe ($1\frac{1}{2}$)–2–4-times as long as the umbel; umbel without bulblets, fasciculate or rarely fasciculate-hemispherical, loose, commonly divaricate, rather many-flowered; pedicels very unequal, 2–9 times as long as perianth, subtended by bracteoles; segments of the narrowly campanulate perianth rose, sometimes dark rose, with a darker nerve, lustrous, intensely colored at the tips, 5–6 mm long, equal, linear-oblong, obtuse, truncate; filaments scarcely shorter than perianth segments, connate and adnate to perianth to 1/4, subulate; anthers yellow; style scarcely exserted, two-fifths the length of capsule; capsule valves obcordate, ca. 5 mm long. July-August.

Steppes, sandy places, and slopes.— European part: U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim., L. Don, L.V.; Caucasus: Cisc.; W. Siberia: U. Tob., Irt.; Centr. Asia: Mtn. Turkm. **Gen. distr.**: S. Eur., Asia Minor (?). There is no indication of location in the cited publication by Linnaeus; in later editions S. Europe is indicated.

Note. The plants from Kopet Dagh deserve further study. With their dingy rose inconspicuous flowers they come close to A. lencoranicum, but differ from it in the coarser bulb tunics and thinner leaves. The plants grow, moreover, in completely different habitats. The Kopet Dagh plant inhabits dry mountain steppes.

106. **A. lencoranicum** Miscz. ex Grossh., Fl. Kavk. I (1928) 214.

Perennial; bulb ovoid, 1–2 cm thick; outer tunics grayish-black, thinly papery; scape 20–50 cm long, covered to 1/2–2/3 with smooth leaf sheaths; leaves 4 or 5, filiform, 1–2 mm broad, revolute, apparently flat, withering at flowering; spathe to 6 times as long as the umbel; umbel fasciculate, loose, relatively few-flowered; pedicels unequal, 2–6 times the length of perianth, subtended by few bracteoles; segments of the narrowly campanulate perianth dingy lilac-rose, with a dingy purple nerve, dull, 5–6 mm long, linear-oblong, obtuse, rounded-truncate, sometimes minutely mucronate; filaments scarcely shorter than to equaling the perianth segments, connate and adnate to perianth to 1/5 their length, subulate; anthers yellow; style exserted, half the length of capsule; capsule valves broadly obovate, ca. 4 mm long. August

Slopes in the timber zone.— Caucasus: Tal. Endemic. Described from Lenkoran.

207 107. A. karsianum Fom. in Monit. Jard. Bot. Tiflis 14 (1909) 51.

Perennial; bulb ovoid, 1–1.5 cm thick; outer tunics grayish, papery, nearly nerveless; scape 20–40 cm long, covered to 2/3–3/4 with smooth leaf sheaths; leaves 3 or 4, narrowly linear, 1–1.5 mm broad, more or less revolute, sulcate, smooth or scabrous, exceeding the scape; spathe 2–3 times as long as the umbel; umbel fasciculate or often fasciculate-hemispherical, mostly dense and many-flowered; pedicels unequal, as long as or up to 2–5 times as long as perianth, subtended by few bracteoles; segments of the narrowly campanulate perianth nearly white, with a purple nerve, lustrous, (6)–7–8 mm long, linear-oblong, obtuse, round-tipped; filaments three-quarters the length of perianth segments, connate and adnate to perianth to 1/5 their length, subulate; anthers yellow (?); style not exserted, half as long as the capsule; capsule valves obcordate, ca. 5 mm long. July.

Stony slopes and rocks. — Caucasus: E. and S. Transc. Endemic. Described from Ol'ta: Kyrkh-kilis — Khas-kei. Type in Tiflis.

Note. A species closely related to A. Kunthianum Vved., in need of verification with fresh material. It is mostly deposited in herbaria under the name A. paniculatum which does not occur in Transcaucasia. It is distinguishable much more readily from the latter species than from A. Kunthianum.

108. **A. Kunthianum** Vved. nom. nov. — A. lepidum Kunth Enum. IV (1843) 408 (p. p., quoad pl. Hohenack.), non Ldb. (1833); Boiss. Fl. Or. V (1884) 263. — A. paniculatum var. macilentum Ldb. Fl. Ross. IV (1853) 176 (p. p.).

Perennial; bulb (often paired) ovoid, 0.75–1 cm thick; outer tunics blackish, papery, without discernible nerves; scape (5)–10–30 cm long, covered to 1/2–2/3 with smooth leaf sheaths; leaves 2–(4), apparently semicylindric, ca. 1 mm broad, sulcate, smooth or scabrous-margined, exceeding the scape; spathe half as long again to twice as long as the umbel; umbel without bulblets, fasciculate-hemispherical, rather few-flowered; pedicels subequal, slightly shorter than to 2–(3) times as long as the perianth, subtended by few bracteoles; segments of the narrowly campanulate perianth rose, mostly dark rose, with a purple nerve, lustrous, (6)–7–8 mm long, equal, linear-oblong, obtusish with more or less reflexed tips; filaments three-quarters as long as to slightly shorter than perianth segments, connate and adnate to perianth to 1/5 their length, subulate; anthers yellow; style not exserted, half the length of the capsule; capsule valves obcordate, ca. 5 mm long. August-September. (Plate XII, Figure 2 a, b).

Meadows and rocks in high mountains. — Caucasus: Cisc., Dag., W., E., and S. Transc. Endemic. Described from vicinity of Shusha.

208 Note. The plant presented by Albov (Tr. Tifl. Bot. Sada I (1895) 240) as A. subquinqueflorum Boiss. should apparently be referred to this species. The author has not seen either Albov's specimens or any other samples of A. subquinqueflorum, a species that, according to Albov, deserves additional study. As described by Boissier, A. subquinqueflorum has smaller white flowers 5 mm long.

109. **A. rupestre** Stev. in Mém. Soc. Nat. Mosc. III (1812) 260. — A. paniculatum var. macilentum Ldb. Fl. Ross. IV (1853) 176 (p.p.). — A. paniculatum var. pallens Boiss. Fl. Or. V (1884) 260 (p.p.). — A. paniculatum var. rupestre Rgl. in A.H.P. III (1875) 192; Shmal'g., Fl. II, 489. — A. charaulicum Fom. in Monit. Bot. Tiflis. 14 (1909) 54 (?). — Ic.: Rchb. Pl. crit. V (1827) f. 616, 617. — Exs.: Pl. orient. exs. No. 57.

Perennial; bulb ovoid, ca. 1 cm thick; outer tunics papery with very slender parallel nerves; bulblets whitish, slenderly parallel-nerved, small, mostly absent; scape 25–40 cm long, covered up to the middle with scabrous or very rarely smooth leaf sheaths; leaves (2)–3, filiform-linear, 0.5–1 mm broad, more or less revolute, commonly scabrous, much shorter than the scape; spathe 3–5 times the length of the umbel; umbel without bulblets, fasciculate or fasciculate-hemispherical, rarely subspherical, commonly few-flowered; pedicels subequal, slightly shorter than to $1\frac{1}{2}$–2 times the length of perianth, subtended by bracteoles; segments of the narrowly campanulate perianth pale rose to nearly white, with a purple nerve, not lustrous, 5–6 mm long, subequal, oblong-elliptic, obtuse, round-tipped or often minutely mucronulate; filaments equaling or barely exceeding the perianth segments, connate and adnate to perianth to 1/5 their length, subulate; anther violet; style exserted, two-fifths the length of capsule; capsule valves broadly obcordate to suborbicular, 5 mm long. August-October.

Stony and sandy slopes and rocks. — European part: Crim.; Caucasus: Dag., W. and E. Transc. Gen. distr.: Asia Minor. Described from Mtskheta.

Note. A charaulicum (classical location Artvin: Kharaul) is described as having filaments half as long as perianth segments and pedicels 4 times the length of perianth. The authentic specimen, preserved in Leningrad, shows stamens as long as perianth segments and pedicels as long or at most half as long again. More investigation is needed to solve the problem of this plant.

110. **A. convallarioides** Grossh. in Grossh. et Schischk. Pl. orient. exs.. (1924) No. 107. — A. pallens Vved. in Fl. Turkm. I (1932) 263. — Exs.: Pl. orient. l.c.

Perennial; bulb ovoid, ca. 1 cm thick; outer tunics grayish, papery, nearly without perceptible nerves; bulblets yellowish, very slenderly
209 parallel-nerve, mostly absent; scape 40–60 cm long, covered to about the middle with smooth leaf sheaths; leaves 4 or 5, narrowly linear, 1–1.5 mm broad, canaliculate, sulcate, smooth, apparently shorter than the scape; spathe $1\frac{1}{2}$–2 (?) times as long as the umbel; umbel without bulblets, fasciculate-ovoid to fasciculate-spherical, densely many-flowered; pedicels unequal, 2–5 times the length of perianth, subtended by bracteoles; perianth segments white, 4–5 mm long, broadly linear-oblong, obtuse, truncate, the inner slightly longer; filaments barely exceeding the perianth segments, connate and adnate to perianth to 1/5, subulate; anthers yellow; style exserted, one-fourth the length of capsule; capsule slightly longer than the perianth; capsule valves suborbicular, scarcely emarginate. June-July.

Slightly saline places. — Caucasus: E. and S. Transc.; Centr. Asia: Turkm. Endemic (?). Described from Erivan, Dzhervish. Type in Baku.

111. A. kirindicum Bornm. in Beih. Bot. Centralbl. XXXIII, 2 (1915) 209.

Perennial; bulb ovoid, 1–1.5 cm thick; outer tunics papery, grayish, with slender distant parallel nerves; bulblets none; scape 15–25 cm long, covered with (1)–2–(5) sheaths; lower sheaths scabrous, the upper often smooth, the uppermost often surpassing the umbel base and spathiform or rarely not reaching beyoond the middle of scape; leaves filiform, canaliculate, scabrous, not exceeding the umbel, the uppermost abbreviated; spathe persistent, much shorter than the umbel, very short-acuminate; umbel fasciculate or fasciculate-hemispherical, loosely few-flowered; pedicels very slender, subequal, 3–5 times as long as the perianth, subtended by bracteoles; segments of the tubular-campanulate perianth white to very pale rose, with a prominent dingy purple nerve, 4–5 mm long, subequal, oblong-lanceolate, obtusish, the inner somewhat broader; filaments two-thirds as long as to slightly shorter than perianth segments, connate and adnate to perianth to 1/3 their length, entire, triangular-subulate, subequal; style not exserted; capsule (immature) two-thirds as long as the perianth. August.

Centr. Asia: Mtn. Turkm. Found on a single occasion on consolidated screes of Mt. Dushak. **Gen. distr.**: Iran. Described from Nehavend

112.* A. fibrosum Rgl. in A.H.P. X (1887) 322, t. VII, f. 2.— A. Korolkovii var. albidum. O.Kt. in A.H.P. X (1887) 243.—
210 A. leucosphaerum Aitch. et Baker in Trans. Linn. Soc. III (1888) 117.— Ic.: Rgl., l.c.— Exs.: Herb. Fl. As. Med. No. 177.

Perennial; bulb ovoid, 0.75–1 cm thick; outer tunics brown, subcoriaceous, splitting, reticulately nerved; bulblets numerous, large, reticulately nerved, yellowish; scape (often 2 scapes from one bulb) (15)–25–60 cm long, covered at base with smooth approximate leaf sheahs; leaves 4–6, semicylindric, 0.5–2 mm broad, canaliculate, fistulous, smooth or rarely scabrous, shorter than the scape; spathe with beak usually longer than the blade, early deciduous by circumscission; umbel without bulblets, hemispherical to subspherical; rarely fasciculate, densely many-flowered; pedicels subequal, $(1\frac{1}{2})$–3–5 times the length of perianth, ebracteolate; segments of the broadly campanute umbilicate perianth white, rose or dark rose, with a prominent green or purple nerve, 4–5–(6) mm long, equal, elliptic to oblong-elliptic, obtuse or mucronulate, the inner broader than the outer; filaments one-half to two-thirds as long as perianth segments, connate and adnate to perianth for 1/4 to 1/2 their length, entire, the inner triangular, twice as broad as the outer, narrowly triangular; style not exserted; capsule slightly shorter than the perianth. April-May.

Sand deserts and motted strated in foothills.— Centr. Asia: Kara K., Mtn. Turkm. **Gen. distr.**: N. Afghanistan. Described from Chikishlyar. Type in Leningrad.

* The A. rubellum s. l. group (112–120) constitutes a highly composite, polymorphic complex of East Mediterranean xerophilous plants, and is still far from being adequately understood. An attempt is here made to distinguish elementary constituents of this group, most of which had been described at one time or other as distinct species but were later considered as synonyms of A. rubellum MB. The constituent entities are not firmly delineated and they displayed transitions in respect of all the characters that could be studied in the herbarium.

Plate XIII

1. Allium scabrellum Boiss. et Buhse, 1a) portion of perianth; 1b) bulblet; 1c) bulb scale.— 2. A. anisopetalum Vved.; 2a) portion of perianth; 2b) bulblets; 2c) bulb scale.-- 3. A. kujukense Vved.; 3a) portion of perianth; 3b) bulblets; 3c) leaf sheath.— 4. A. elegans Drob. 4a) portion of perianth; 4b) bulblets.

113. A. **syntamanthum** C. Koch. in Linnaea XXII (1849) 238. — A. rubellum var. parviflorum Ldb. Fl. Ross. IV (1853) 171 (p.p.); Boiss. Fl. Or. V (1884) 253 (p.p.).

Perennial; bulb ovoid, ca. 1 mm thick; outer tunics brown, coriaceous, splitting, prominently subreticulately nerved; bulblets few, large, winged, elongated, yellowish, slenderly nerved; scape 15–30 cm long, covered to 1/4–1/3 with smooth approximate leaf sheaths; leaves 3 or 4, semicylindric, canaliculate, apparently fistulous, smooth, ca. 1 mm broad, apparently shorter than the scape; spathe early deciduous by circumscission, more or less rose-tinged; umbel without bulblets, semispherical to subspherical, dense, rather many-flowered; pedicels subequal, slightly exceeding or often 2–(3) times as long as the perianth, ebracteolate; segments of the
213 broadly campanulate umbilicate perianth dark rose with a purple nerve, 3–4 mm long, linear-oblong, obtuse, the outer half as broad again and barely shorter than the inner; filaments slightly shorter than perianth segments, connate and adnate to perianth to 1/4 their length, entire, the outer narrowly triangular, the inner triangular, half as broad again as the outer and as broad at base as the perianth segments; style not exserted; capsule scarcely shorter than the perianth. May-June.

Stony slopes. — Caucasus: S. Transc. Endemic. Described from Erivan area. Type in Berlin.

114. **A. rubellum** MB. Fl. taur.-cauc. I (1808) 264; III, 260. — A. rubellum var. parviflorum Ldb. Fl. Ross. IV (1853) 171 (p.p.); Boiss. Fl. Or. V (1884) 253 (p.p.).

Perennial; bulb ovoid, ca. 1 cm thick; outer tunics brown, coriaceous, splitting, prominently subreticulately nerved; bulblets few, large, winged, yellowish, slenderly nerved; scape (sometimes 2 from one bulb) 15–40 cm long, covered at base or up to 1/4 with approximate smooth leaf sheaths; leaves 3 or 4, semicylindric, canaliculate, fistulous, smooth or rarely scabrous-margined, 1–2 mm broad, commonly shorter than the scape; spathe slightly shorter than the umbel, with beak somewhat shorter than the blade, early deciduous by circumscission; umbel without bulblets, hemispherical to subspherical, densely many-flowered; pedicels subequal, 2–3 times the length of perianth, ebracteolate; segments of the broadly campanulate umbilicate perianth rose, with a purple nerve, 3–4–(5) long, oblong or often oblong-lanceolate, tapering, acute to obtusish, the outer slightly broader and shorter than the inner; filaments two-thirds to three-quarters the length of perianth segments, connate and adnate to perianth, to 1/4, entire, the outer narrowly triangular, the inner triangular, half as broad again as the outer and as broad at base as perianth segments; style not exserted; capsule slightly shorter than the perianth. May.

Dry slopes. — Caucasus: E. Transc., Tal. (?). **Gen. distr.**: N. Iran (?). Described from Georgia.

Note. The typical A. rubellum s.s. occurs in the western part of E. Transcaucasia and does not reach Gandzha. Here as well as to the southeast along the right bank of Kury A. rubellum is not always distinguishable from A. albanum. The author therefore refers the Talysh plants and some of the north Persian material to this species with a query.

115. A. **albanum** Grossh. in Fl. Kavk. I (1928) 211. — A. rubellum var. grandiflorum Ldb. Fl. Ross. IV (1853) 171; Boiss. Fl. Or. V

(1884) 253 (p.p.).— A. rubellum Shmal'g., Fl. II (1897) 490.— Ic.: Rgl. Fl. turk. (1876) t.X, f. 7–9.

Perennial; bulb ovoid, ca. 1 cm thick; outer tunics coriaceous, brown,
214 splitting, prominently subreticulately nerved; bulblets few, usually small, yellowish, very rarely brownish, sometimes winged, slenderly nerved; scape (often 2 from one bulb) 10–30 cm long, covered at base with smooth approximate leaf sheaths; leaves 4–5 (6), semicylindric, canaliculate, fistulous, smooth or rarely scabrous-nerved, 1–2–(3) mm broad, mostly shorter than the scape; spathe slightly shorter than the umbel, with beak as long as blade, early deciduous by circumscission, sometimes rose-tinged; umbel without bulblets, hemispherical or rarely spherical, densely many-flowered; pedicels subequal, 2–3–(4) times the length of perianth, ebracteolate; segments of the campanulate umbilicate perianth rose, with a purple nerve, (4)–5–6 mm long, oblong-lanceolate, tapering, acute or subacute, the outer slightly broader and shorter than the inner; filaments one-half to two-thirds the length of perianth segments, connate and adnate to perianth to 1/4 their length, entire, the outer narrowly triangular, the inner triangular, half as broad again as the outer and as broad at base as the perianth segments; style not exserted; capsule (one-half or) two-thirds as long as the perianth. May-June.

Dry slopes in semideserts and in dry mountain steppes.— European part: L.V. (Bogdo); Caucasus: Dag., E. Transc. (to the east of Gandzha); Centr Asia: Ar.-Casp. (Mangyshlak, Karabugaz), Mtn. Turkm. Gen. distr.: N. Persia. Described from various locations in E. Transc.

Note. Plants from Apsheron deserve more study, as they are usually low-growing, with leaves exceeding the scape, and in some characters (e.g., bulblet nervature, flower color) they approach A. scabrellum. The inclusion of high-mountain Kopet Dagh plants in this species is also in need of confirmation.

The position of Kopet Dagh plants of A. rubellum s.l. groups, with small white flowers, supplied by various collectors from Gaudan, has not so far been clarified.

116. **A. scabrellum** Boiss. et Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 215; Boiss. Fl. Or. V (1834) 251.— A. rubellum ssp. scabrellum Vved. in Herb. Fl. As. Med. (1926) No.180.— Exs.: HFR No.1190 (sub A. Tschulpias); Herb. Fl. As. Med., l.c.

Perennial; bulb ovoid, (1)–2 cm thick; outer tunics subcoriaceous, brown, reticulately nervose, sometimes fibrous; bulblets commonly numerous, small, yellowish, wingless, often distinctly alveolate; scape 25–50 cm long, covered to 1/3 with smooth or rarely scabrous subdistant leaf sheaths; leaves 3 or 4, semicylindric, canaliculate, fistulous, scabrous-nerved, rarely smooth, 2–3 mm broad, shorter than the scape; spathe slightly shorter than the umbel, with beak about the length of blade, rarely deciduous by circumscission, often rose-tinged; umbel without
215 bulblets, fasciculate-hemispherical or rarely subspherical, densely many-flowered; pedicels subequal, 2–3 times the length of perianth, ebracteolate; segments of the narrowly campanulate umbilicate perianth commonly pale rose, obscurely purple-nerved, lustrous in drying, (5)–6–7 mm long, subequal, lanceolate to oblong-lanceolate, commonly strongly tapering, acute or subacute, the outer slightly broader than the

inner; filaments one-third to one-half the length of perianth segments, connate and adnate to perianth to 1/4–1/3 their length, entire, the outer narrowly triangular, the inner commonly broadly triangular, twice as broad as the outer and usually somewhat broader than the perianth segments; style not exserted; capsule half as long as the perianth. May-June. (Plate XIII, Figure 1 a–c).

Usually a weed in oases. — Centr. Asia: Mtn. Turkm., Syr D., Pam.-Al. **Gen. distr.**: Iran. Described from Yezd. Type in Leningrad.

117. A. **Jacquemontii** Kunth, Enum. IV (1843) 399.

Perennial; bulb ovoid, 0.5–1 cm thick; outer tunics grayish, nearly papery, with subparallel nerves; bulblets few, whitish, wingless, slenderly nerved; scape 15–35 cm long, covered to 1/4–1/3 with smooth subdistant leaf sheaths; leaves 2–(3), semicylindric, canaliculate, fistulous, smooth or rarely scabrous, 1–2 mm broad, shorter than the scape; spathe early deciduous by circumscission; umbel without bulblets, hemispherical, dense, rather few-flowered; pedicels subequal, $1\frac{1}{2}$–(2) times the length of perianth, ebracteolate, segments of the campanulate umbilicate perianth rose, with a prominent dingy purple nerve, 5–(6) mm long, subequal, slightly tapering, oblong-lanceolate, acute, the outer slightly broader than the inner; filaments about two-thirds the length of perianth, connate and adnate to perianth to 1/3, entire, the outer narrowly triangular, the inner broadly triangular, twice as broad as the outer and slightly broader at base than the perianth segments. May.

Stony slopes in the lower mountain zone. — Centr. Asia: Pam.-Al. (Shugnan). **Gen. distr.**: NW India. Described from India. Type in Paris.

Note. The author refers the Shugnan material to this species with some reservation, as he did not have any Indian plants for comparison.

118. A. **anisopetalum** Vved. in Bull. Univer. As. Centr. 19 (1934) 123.

Perennial; bulb ovoid 0.5–0.75–(1) cm thick; outer tunics grayish-brown or brown, coriaceous, splitting, obscurely subreticulately nerved; bulblets few, wingless, small, whitish, slenderly nerved; scape 10–25–(40) cm long, covered to 1/3 with smooth subdistant leaf sheaths; leaves 2 or 3 (4), filiform, apparently semicylindric, canaliculate, smooth or rarely scabrous-margined, 0.5–1.5 mm broad, commonly shorter than the scape;
216 spathe commonly two-thirds as long as the umbel, with beak one-third to one-half the length of blade, sometimes rose-tinged, usually persistent, split down to base; umbel without bulblets, fasciculate-hemispherical or subspherical, dense, rather many-flowered; pedicels subequal, as long as or often $1\frac{1}{2}$–2 times the length of perianth, ebracteolate; segments of the campanulate umbilicate perianth rose, with a dingy purple nerve, unequal, the outer (4)–5–(6) mm long, strongly tapering, acute, oblong to oblong-lanceolate, rarely lanceolate, one-fourth to often one-half as long again and half as broad again as the oblong to oblong-elliptic acute inner segments; filaments one-third to two-fifths the length of outer perianth segments, connate and adnate to perianth to 1/3–1/2 their length, the outer narrowly triangular, the inner broadly triangular, 2–(3) times as broad as the outer and about as broad at base as the perianth segments; style not exserted; capsule half as long as the perianth. (Plate XIII, Figure 2 a–c).

Gravelly and small-grained slopes in the mountain steppe zone.— Centr. Asia: Pam.-Al. (Alai Range), T. Sh. (Fergana Range). Endemic. Described from Fergana Range: Arslanbob. Type in Leningrad.

119. **A. minutum** Vved. in Bull. Univer. As. Centr. 19 (1924) 124.

Perennial; bulb ovoid, 0.5–0.75 cm thick; outer tunics subcoriaceous, blackish-brown, more or less splitting, subreticulate-nerved; bulblets few, wingless, small, whitish, with slender nerves; scape 10–20 cm long, slender, covered to 1/4 with subdistant leaf sheaths; leaves 2 or 3, filiform, ca. 0.5 mm broad, apparently semicylindric, canaliculate, smooth, shorter than the scape; spathe two-thirds as long as the umbel, very short-acuminate, persistent, split down to base; umbel without bulblets, fasciculate-hemispherical or hemispherical, dense, rather few-flowered; pedicels subequal, as long to $1\frac{1}{2}$–(2) times as long as the perianth, ebracteolate; segments of the broadly campanulate umbilicate perianth white, with a dingy green nerve, 3–4–(5) mm long, oblong or very rarely oblong-lanceolate, commonly short-acuminate, acute, the outer usually slightly longer and broader than the inner; filaments half the length of perianth segments, connate and adnate to perianth to 1/3, entire, the outer triangular, the inner broadly triangular, about twice as broad as the outer and as broad at base as the perianth segments; style not exserted; capsule two-thirds as long as the perianth. May-July.

Gravelly and mottled (always?) mountain slopes.— Centr. Asia: Pam. Al. (Fergana Range). Endemic. Described from Kok-su Valley. Type in Leningrad.

120. **A. parvulum** Vved. in Bull. Univers. As. Centr. 19 (1934) 124.

217 Perennial; bulb ovoid, 0.5–0.75 cm thick; outer tunics subcoriaceous, blackish-brown, more or less splitting, subreticulately nerved; bulblets few, wingless, small, whitish, slenderly nerved; scape (sometimes 2 from one bulb), 10–20 cm long, slender, covered to 1/4 with subdistant smooth leaf sheaths; leaves 3 or 4, filiform, ca. 0.5 mm broad, apparently semicylindric, canaliculate, smooth, shorter than the scape; spathe one-half (or two-thirds) as long as the umbel, with beak one-fourth to one-third the length of blade, commonly persistent, split down to base; umbel without bulblets, fasciculately-hemispherical or hemispherical, dense, rather many-flowered; pedicels subequal, $(1\frac{1}{2})$–2–3 times as long as perianth, ebracteolate; segments of the campanulate umbilicate perianth white, with a dingy green nerve, 4–(5) mm long, equal, oblong-lanceolate to lanceolate, strongly tapering, acute, often with reflexed tips; filaments half the length of perianth segments, connate and adnate to perianth to 1/3 their length, entire, the outer narrowly triangular, the inner broadly triangular, twice as broad as the outer and somewhat broader at base than the perianth segments; style not exserted; capsule half as long as the perianth. May.

Gravelly (apparently mottled) slopes in the lower mountain slopes.— Centr. Asia: T. Sh. (Aleksandrovskii Range, Trans-Ili Ala Tau). Endemic. Described from Aulie-ata: Tek-Turmas. Type in Leningrad.

121. A. **Griffithianum** Boiss. Diagn. pl. as. nov. II, 4 (1859) 117. — A. Tschulpias Rgl. in A.H.P. III (1875) 107. — A. Kuschakewiczi Rgl., l.c. (1875) 117. — A. tenue Rgl., l.c. (1875) 206, non Don. — A. Bahri Rgl. in A.H.P. X (1887) 326, t. 1, f. 2. — Ic.: Rgl. Fl. Turk. (1876) t.X, f. 10–12; ibid., t.XI, f. 12–13. — Exs.: Herb. Fl. As. Med. No. 66 (sub A. Tschulpias).

Perennial; bulb ovoid, 1–2 cm thick; outer tunics subcoriaceous, splitting, reticulately nerved; bulblets few, large, yellowish, reticulately nerved; scape 10–30–(50) cm long, covered at base or up to 1/3 with smooth or rarely scabrous leaf sheaths; leaves 2 or 3, semicylindric, canaliculate, fistulous, 1–2 mm broad, commonly scabrous-margined, usually shorter than the scape; spathe slightly shorter than the umbel, short-beaked, early deciduous by circumscission; umbel without or very rarely with bulblets, hemispherical, dense, rather many-flowered; pedicels mostly unequal, shorter than or mostly as long to twice as long as perianth, ebracteolate; segments of the campanulate perianth light carneous-red, with a darker nerve, oblong-lanceolate to lanceolate, obtusish to obtuse, unequal, the outer 7–8 mm long, 1/4–1/3 as long again as and slightly broader than the gibbous inner segments; filaments one-third the length of outer perianth segments, connate and adnate to perianth to 1/2–2/3 their length, entire,
218 the inner triangular, twice as broad as the narrowly triangular outer filaments; style not exserted; capsule half as long as the perianth. April-May.

Soft soils of foothills deserts and of the lower mountain zone. — Centr. Asia: Syr D., Pam.-Al. (not occurring in Fergana Valley). **Gen. distr.**: Afghanistan. Described from Kabul area. Type in Geneva.

122. A. **ophiophyllum** Vved. in Herb. Fl. As. Med. (1928) No. 336. — Exs.: l.c.

Perennial; bulb ovoid, ca. 1 cm thick; outer tunics tawny-brown, subcoriaceous, obscurely reticulately nerved, laciniate at the top and at base; bulblets few, stramineous, parallel-nerved; scape 15–40 cm long, covered at base with smooth approximate leaf sheaths; leaves 3 or 4, cylindric, fistulous, 1–1.5 mm broad, glaucous, spirally to circinately coiled, smooth or slightly scabrous; spathe persistent, two-thirds as long as the umbel, very short-beaked; umbel without bulblets, fasciculate or hemispherical, commonly few-flowered, rather dense; pedicels subequal, (1)–1½–2 times as long as perianth, ebracteolate; segments of the campanulate perianth pale violet with a darker nerve, lustrous azure after anthesis, (6)–7 mm long, obtuse, the inner linear-oblong, slightly longer than the lanceolate outer segments; filaments as long as or barely shorter than the perianth segments, at base connate and adnate to perianth, entire, violet, the outer triangular-subulate, the inner narrowly triangular, slightly broader than the outer; style scarcely exserted; capsule half as long as the perianth. April-May.

Mottled outcrops. — Centr. Asia: Amu D., Pam.-Al. Endemic. Described from Khaudak-tau. Type in Tashkent.

123. **A. inops** Vved. in Not. Syst. Herb. Horti Bot. Petrop. V (1924) 91.

Perennial; bulb ca. 1 cm thick; outer tunics tawny ot grayish, nearly papery, nerveless; scape 8–17 cm long, covered to 1/3 with smooth leaf

sheaths; leaves 2 or 3, apparently semicylindric, filiform, ca. 0.5-mm broad, smooth, slightly shorter than to equaling the scape; spathe early deciduous, scarious; umbel without bulblets, fasciculate becoming subspherical, loosely few-flowered; pedicels equal, 2–3 times as long as perianth, subtended by bracteoles; segments of the narrowly campanulate perianth rose, with a purple nerve, 6–7 mm long, equal, lanceolate, acute or acutish; filaments connate and adnate to perianth to 1/4 their length, the inner subulate from triangular base, one-third as long as perianth segments, half as long again and 2–3 times as broad as the subulate outer filaments;
219 anthers yellow; style not exserted, one-third the length of the capsule; capsule half as long as the perianth, the suborbicular valves scarcely emarginate. May.

Outcrops of saline layers. — Centr. Asia: T. Sh. Endemic. Described from Aulie-ata area: Dair-mulla. Type in Leningrad.

124. **A. lasiophyllum** Vved. in Bull. Univer. As. Centr. 19 (1934) 125.

Perennial; bulb ovoid, 5–8 mm thick; outer tunics gray, papery, nerveless, enveloping the scape base; bulblets none; scape (very rarely 2 from one bulb) 10–20 cm long, covered up to the middle with densely short-hairy leaf sheaths; leaves 2–4, filiform, 0.5–1 mm broad, apparently flat, canaliculate, glabrous or more or less densely pubescent, shorter than the scape; spathe about one-third as long as the umbel, with beak less than half the length of blade, persistent; umbel without bulblets, fasciculate, rather few-flowered; pedicels subequal, as long to half as long again as the perianth, subtended by bracteoles; segments of the narrowly campanulate perianth rose, with a darker nerve, 6–7 mm long, equal, linear-lanceolate, acute, the outer scarcely broader; filaments three-quarters the length of perianth segments, at base connate and adnate to perianth, entire, the inner triangular-subulate, half as broad again at base as the nearly subulate outer filaments; anthers yellow; style not exserted; capsule (nearly mature) about half as long as the perianth. June.

Centr. Asia: T. Sh. (Tekes). Endemic. Type in Leningrad.

125. **A. delicatum** Siev. ex Roem, et Schult. Syst. VII (1830) 1133; Ldb. Fl. Ross. IV, 171; Shmal'g., Fl. II, 490; Kryl., Fl. Zap. Sib. III (1929) 610. — A. Willdenowii Kunth. Enum. IV (1843) 453; Ldb. Fl. Ross. IV, 190. — A. viridulum auct. — Ic.: Rgl. Fl. turk. (1876) t. IX, f. 7–9.

Perennial; bulb ovoid, 0.75–1.5 cm thick; outer tunics gray to nearly black, papery, nerveless; bulblets solitary, nearly smooth, mostly absent; scape 15–45 cm long, covered to 1/3–1/2 with smooth leaf sheaths; leaves 2 or 3, filiform, 0.5–1.5 mm broad, apparently semicylindric, canaliculate, smooth or very rarely scabrous, shorter than the scape; spathe one-half to two-thirds as long as the umbel, with beak as long to 3 times as long as the blade, persistent; umbel without bulblets, fasciculate or often fasciculate-hemispherical, rarely subspherical, densely many-flowered; pedicels subequal, slightly exceeding or mostly 2–3–(4) times as long as the perianth, subtended by numerous fairly large bracteoles; segments of the campanulate perianth whitish or rose, with a prominent violet-purple nerve, (3)–4–6 mm long, equal, obtusish to acutish, lanceolate to oblong, the inner somewhat broader; filaments three-quarters as long as to equaling

220 the perianth segments, connate and adnate to perianth to 1/5 their length, entire, triangular-subulate, the inner half as broad at base as the outer filaments; style scarcely exserted; capsule slightly shorter than the perianth. June-July.

Solonetz soils, wormwood deserts, rarely on chalk. — European part: Transv. (S.), L.V.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh. **Gen. distr.**: Dzu.-Kash. Described from "Kirghizian deserts".

126. **A. glomeratum** Prokh. in Bull. Jard. Bot. Princ. URSS, XXIX (1930) 560, tab. II.

Perennial; bulbs ovoid, 1–1.5 cm thick; outer tunics gray, papery, slenderly parallel-nerved, enveloping the scape base; bulblets none; scape often more or less curved, 10–20 cm long, covered up to the middle with smooth leaf sheaths; leaves 2 or 3, narrowly linear, 0.5–1.5 mm broad, apparently flat, canaliculate, smooth or scabrous-margined, slightly shorter to slightly longer than the scape; spathe persistent, about equaling the umbel, with beak half as long as to slightly shorter than the base; umbel without bulblets, hemispherical, dense, few-flowered; pedicels subequal, slightly shorter than to equaling the perianth, subtended by narrow bracteoles; segments of the campanulate perianth rosy-violet, with a darker nerve, (4)–5 mm long, lanceolate, acute, the outer scarcely broader; filaments slightly shorter than to as long as the perianth segments, at base connate and adnate to perianth, entire, subulate, subequal; anthers violet; style scarcely exserted; capsule two-thirds as long as the perianth. July-August.

Argillaceous and stony slopes. — Centr. Asia: T. Sh. (Centr. Tien Shan). **Gen. distr.**: Dzu.-Kash. Described from Kashgaria: Kok-Muinak Pass. Type in Leningrad.

127. **A. Pallasii** Murr. Comment. Goetting, VI (1775) 32, t. 3; Ldb. Fl. Ross. IV, 170; Kryl., Fl. Zap. Sib. III (1929) 612. — A. tenue Don. Mon. (1826) 34. — A. lepidum Ldb. lc. pl. Fl. Ross. IV (1833) 17. — A. caricifolium Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 854. — A. semiretschenskianum Rgl. in A.H.P. V (1878) 630. — A. Albertii Rgl. in A.H.P. V (1878) 632. — Ic.: Ldb. Ic. pl. Fl. Ross. IV (1833), t. 355. — Exs.: H.F.A.M. No. 337.

Perennial; bulb ovoid, 1–2 cm thick; outer tunics gray, papery and nerveless or subcoriaceous brownish and parallel-nerved; bulblets none; scape (sometimes 2 from one bulb), (10)–20–65 cm long, covered to 1/3 or nearly to the middle with smooth leaf sheaths; leaves (2)-3 or 4, filiform to narrowly linear, 0.5–1.5–(2.5) mm broad, smooth or scabrous-margined, shorter than the scape; spathe persistent, one-third to one-half as long as to slightly shorter than the umbel, short-acuminate; umbel without bulblets, hemispherical to subspherical, loosely many-flowered; pedicels subequal,
221 $(1\frac{1}{2})$–2–3(4) times as long as perianth, subtended by few bracteoles or ebracteolate; segments of the broadly campanulate or sometimes substellate perianth rose, with a purple nerve, lustrous, 3–4 mm long, equal, lanceolate to oblong-lanceolate, obtuse to acutish; filaments equaling to half as long again as the perianth segments, at base connate and adnate to perianth, subulate from a triangular base, the inner to half as broad again at the base as the outer, sometimes obtusely 2-toothed at base; scape slightly exserted; capsule as long to half as long again as the perianth. May-June.

Solonetz soils, calcareous slopes, mottled outcrops, and stony or gravelly slopes in the alpine and subalpine zones. — W. Siberia: Irt., Alt.; Centr. Asia: Ar.-Casp. (Mai-tyube), Balkh., Dzu.-Tarb., Pam.-Al., T. Sh. Gen. distr.: Dzu.-Kash. Described from Siberia.

Note, The outer tunics of mountainous plants are papery and nerveless; in the case of lowland plants they are usually coriaceous and distinctly parallel-nerved. A thorough investigation of this phenomenon is needed.

128. A. macrostemum Bge in Mém. Acad. Pétersb. II (1835) 139; Kom. and Alis., Opred. rast. Dal'nevost. kraya I (1931) 365. — A. uratense Franch. in Nouv. Arch. Mus. Hist. Nat. VII (1884) 114.

Perennial; bulb subglobose, 1–2 cm thick; outer tunics blackish, papery, nerveless; bulblets none; scape (40)–60–90 cm long, covered to 1/4–1/3 with smooth leaf sheaths; leaves 3 or 4, linear, 2–4 mm broad, not fistulous, canaliculate, smooth, much shorter than the scape; spathe persistent, half as long as the umbel, with beak half as long to nearly as long as the blade; umbel bearing bulblets (sometimes nearly flowerless), rarely without bulblets (var. uratense Airy-Shaw in Notes Bot. Gard. Edinb. XVI (1931) 136), hemispherical to spherical, rather many-flowered, dense; pedicels subequal, (2)–3–4 times as long as perianth, subtended by numerous bracteoles; segments of the broadly campanulate to subhemispherical perianth dark rose, with a darker nerve, (4)–5 mm long, subequal, oblong to oblong-lanceolate, acutish; filaments one-fourth as long again as the perianth segments, at base connate and adnate to perianth, entire, gradually subulate from a dilated base, the inner half as broad as the outer; style exserted. June-July.

Meadows and arable land. — Far East: Uss. Gen. distr.: Jap.-Ch. Described from Peking.

129. A. coeruleum Pall. Reise... II (1773) 727, t. R.; Ldb. Fl. Ross. IV, 170; Kryl., Fl. Zap. Sib. III (1929) 611. — A. coerulescens Don. Mon. (1826) 34. — A. azureum Ldb. Fl. Alt. II (1830) 13. — A. viviparum Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 852;
222 Kryl., Fl. Zap. Sib. III (1929) 611. — Ic.: Ldb. Ic. pl. Fl. Ross. II (1830) t. 136. — Exs.: Herb. Fl. As. Med. No. 335.

Perennial; bulb subglobose, 1–2 cm thick; outer tunics papery, gray, nerveless; bulblets grayish-violet to violet, nerveless, commonly absent; scape (rarely 2 from one bulb) 25–85 cm long, covered to 1/3 with smooth or scabrous leaf sheaths; leaves (2) 3 or 4, triquetrous, canaliculate, (1)–2–4 mm broad, smooth or rarely scabrous, shorter than the scape; spathe one-half to two-thirds as long as the umbel, acuminate, persistent; umbel without or (in var. bulbilliferum Ldb., Fl. Ross. IV (1853) 170) with bulblets, hemispherical to spherical, densely many-flowered; pedicels equal, 2–5 times as long as perianth, subtended by bracteoles; segments of the broadly campanulate, perianth azure, with a darker nerve, 4–5 mm long, equal, obtusish, the outer oblong-lanceolate, the inner lanceolate; filaments equaling to slightly exceeding the perianth segments, at base connate and adnate to perianth, subulate from a triangular base, the inner twice as broad at base as the outer, sometimes 2-toothed below the middle; style exserted; capsule slightly shorter than the perianth. June-July.

Solonetz soils, solonetz meadows, steppe mountain zone. — European part: L. V.; W. Siberia: U. Tob. (Naurzum), Irt. (S.), Alt.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh. (except Tashkent Ala Tau), Pam.-Al. (Alai Range, Mogian). Gen. distr.: Dzu.-Kash. Described from the vicinity of Semipalatinsk: Berezovka.

Note. Where A. coeruleum and A. caesium grow together, they hybridize; such hybrids are known, for instance, from the Kulan-utmes River (Irt.).

130. A. caesium Schrenk in Bull. phys.-math. Acad. Pétersb. II (1844) 113; Ldb. Fl. Ross. IV, 166. — A. urceolatum Rgl. in A. H. P. II (1873) 406. — A. Renardi Rgl. in A. H. P. VI (1880) 521. — Ic.: Rgl. Fl. turk. (1876) t. IX, f. 10–12. — Exs.: Herb. Fl. As. Med. No. 56; HFR No. 2789.

Perennial; bulb ovoid, 1–1.5 cm thick; outer tunics subcoriaceous, gray, nerveless; bulblets grayish-brown or violet, obscurely parallel-nerved; scape 15–65 cm long, covered to 1/4 or sometimes to the middle with scabrous or rarely smooth leaf sheaths; leaves 2 or 3, semicylindric, canaliculate, 1–3 mm broad, fistulous (always?), scabrous, rarely nearly smooth, slightly shorter to slightly longer than the scape; spathe half as long as the umbel, acuminate, persistent; umbel commonly without or rarely with bulblets, very rarely flowerless with bulblets alone, usually hemispherical to spherical, densely many-flowered; pedicels equal, 2–3–(5) times as long as perianth, subtended by bracteoles; segments of the campanulate perianth azure-blue, with a darker nerve, rarely white,
223 4–6 mm long, equal, oblong to oblong-lanceolate, obtusish, the inner slightly broader; filaments three-quarters as long to nearly as long as perianth segments, at base connate and adnate to perianth, the outer triangular from a subulate base, the inner twice as broad at base, dilated to 2/3, obtusely toothed; style slightly exserted; capsule two-thirds as long as the perianth. May-June.

Solonetz soils in the steppe belt, semideserts, and in the southern part in foothills and mountains up to 2000 m. — W. Siberia: Irt. (S.); Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Syr D., Pam.-Al. (Alai and Turkestan ranges), T. Sh. Gen. distr.: Dzu.-Kash. Described from Karaganda. Type in Leningrad.

Note. As far as can be deduced from herbarium material, plants from the Alai Range and partly from the Fergana Range usually have darker flowers with distinct violet tinge, commonly narrower and longer, mostly 6 mm long. Such plants were designated by Drobov (in herb. Akad. et Univ. As. Med.) as A. Litvinovii and were evidently scheduled for publication in Herb. Fl. Ross. under this appellation. These Fergana plants and also white-flowered plants which sometimes occur in considerable numbers in certain locations (e.g., in Chu-Ili Mountains, Chimgan) should be subjected to further investigation. A. Renardi was described by Regel as having white flowers.

131. A. elegans Drob. in Sched. ad HFR (1917) No. 2790.

Perennial; bulb ovoid, 0.75–1 cm thick; outer tunics coriaceous, grayish or brownish, splitting, nerveless; bulblets few, brownish or violet, smooth; scape 10–20 cm long, covered to 1/4–1/3 with smooth leaf sheaths; leaves 2, filiform, 0.5–1 mm broad, canaliculate, smooth, slightly shorter

than to as long as the scape; spathe very small, much shorter than the umbel, acuminate, persistent; umbel without bulblets, fasciculate or often hemispherical to subspherical, rather few-flowered, loose; pedicels subequal, (3)–4–6 times as long as perianth, the outer ascending, subtended by bracteoles; segments of the campanulate perianth white drying pale violet, with a darker nerve, 5–6 mm long, subequal, lanceolate, obtusish; filaments two-thirds as long as perianth segments, connate and adnate to perianth to 1/4 their length, entire, triangular-subulate, the inner twice as broad at base as the outer; style not exserted; capsule half as long as the perianth. May-June. (Plate XIII, Figure 4a, b).

Gravelly argillaceous slopes. — Centr. Asia: Pam.-Al. (Alai Range, Sary-tau). Endemic. Described from Alai Range: Shakhimardan River, village of Pul'gan. Type in Leningrad.

132. A. **kopetdagense** Vved. in Bull. Univer. As. Centr. 19 (1934) 125.

224 Perennial; bulb ovoid, 0.5–0.75 mm broad; outer tunics papery, gray, obscurely parallel-nerved; bulblets none; scape 5–12 cm long, covered to 1/2–3/4 woth smooth leaf sheaths; leaves 3, filiform, semicylindric, canaliculate, smooth, greatly exceeding the umbel; spathe persistent, one-third as long as the umbel, beakless; umbel without bulblets, hemispherical or rarely subspherical, loosely few-flowered; pedicels subequal, as long to half as long again as the perianth, ebracteolate; segments of the campanulate perianth rose, with a purple nerve, 6–7 mm long, narrowly lanceolate, acute, equal; filaments two-thirds as long as perianth segments, connate and adnate to perianth to 1/3 their length, entire, the outer triangular-subulate, the inner triangular 3 times as broad as the outer and half as broad again at base as the perianth; style not exserted; capsule about half as long as the perianth, with broadly obcordate valves. June.

Gravelly slopes. — Centr. Asia: Mtn. Turkm. Endemic. Described from Prokhladnyi. Type in Leningrad.

133. **A. oreophiloides** Rgl. in A.H.P. III (1875) 114. — Ic.: Rgl. Fl. turk. (1876) t. XI, f. 4–6.

Perennial; bulb spherical, 1–1.5 cm thick; outer tunics grayish, papery, nerveless; bulblets none; scape 3–10 cm long, smooth or more or less scabrous, sometimes very strongly so, covered to 1/4 or up to the middle with smooth or more or less scabrous leaf sheaths; leaves 2, filiform, ca. 0.75 mm broad, apparently semicylindric, canaliculate, scabrous to nearly smooth, exceeding the scape; spathe persistent, acuminate, one-third to one-half as long as the umbel; umbel without bulblets, hemispherical to subspherical, rather few-flowered, commonly dense; pedicels subequal, 2–3 times as long as perianth, subtended by few bracts; segments of the broadly campanulate perianth pale rose, with a prominent purple nerve, 4–5 mm long, equal, acute, the inner oblong-ovate, slightly broader than the oblong outer segments; filaments two-thirds the length of perianth segments, connate and adnate to perianth to 1/4 their length, the outer triangular-subulate, the inner twice as broad at base, dilated nearly to apex, 2-toothed; style not exserted; capsule about half as long as the perianth. July-August.

Moraines and rocks in the alpine zone. — Centr. Asia: Pam.-Al., T.Sh. (Susamyr, Western Karakol and Talas river valleys). Endemic. Described from Shurovskii Glacier. Type in Leningrad.

Note. The Tien Shan plants are more elongated and usually very hairy, but the available material is insufficient for any attempt to determine their taxonomic position.

134. **A. schoenoprasoides** Rgl. in A.H.P. V (1878) 630. — A. sairamense Rgl. in A.H.P. VI (1880) 520. A. Kesselringii Rgl.
225 in A.H.P. VIII (1883) 272. — Ic.: Rgl. in A.H.P. X (1887) t. 1, f. 3. — Exs.: Herb. Fl. As. Med. No. 340.

Perennial; bulb broadly ovoid to subspherical 1–1.5 mm thick; outer tunics papery, blackish, very thin, nerveless; bulblets none; scape (10)–15–40 cm long, covered to 1/3–1/2 or to slightly above the middle with smooth leaf sheaths; uppermost sheath inflated in upper part; leaves 2 (3), narrowly linear, (1)–2–3 mm broad, flat, canaliculate, smooth or rarely scabrous-margined, commonly somewhat shorter than the scape; spathe slightly shorter than to equaling the umbel, short-acuminate, early deciduous; umbel without bulblets, hemispherical or often spherical, rather many-flowered, dense, sometimes subcapitate; pedicels subequal, half as long as to equaling and finally to half as long again as the perianth, ebracteolate or with few bracteoles; segments of the narrowly campanulate perianth rose, with a faint darker nerve, lustrous, (4)–6–7–(8) mm long, subequal, oblong-lanceolate, acutish to obtusish, entire, the outer slightly broader than the inner; filaments one-half to two-thirds as long as perianth segments, connate and adnate to perianth to 1/3 their length, the outer subulate from a narrowly triangular base, the inner twice as broad as the outer, dilated to 2/3 its length, more or less 2-toothed; style not exserted; capsule half as long as the perianth. July-August.

Stony slopes in the alpine and subalpine zones. — Centr. Asia: Dzu.-Tarb., T.Sh. (chiefly Centr.), Pam.-Al. (Alai Range, Valkhan). Gen. distr.: Dzu.-Kash. Described from Alma Ata area.

135. **A. kujukense** Vved. in Trans. Sc. Soc. Turk. I (1923) 124.

Perennial; bulb ovoid, 0.75–1 cm thick; outer tunics papery, gray, somewhat produced at the top; bulblets few, whitish, pitted, sometimes absent; scape 7–20 cm long, sometimes covered (and buried in soil) with very scabrous leaf sheaths; leaf solitary, cylindric, 1–2 mm broad, fistulous, very scabrous, usually greatly surpassing the umbel; spathe persistent, half as long as the umbel, beakless; umbel without bulblets, fasciculate-hemispherical or rarely subspherical, loose, rather few-flowered; pedicels subequal, as long to twice as long as the perianth, ebracteolate; segments of the narrowly campanulate perianth purple, with a darker nerve, 8–10 mm long, equal, acute, the outer lanceolate, the inner oblong-lanceolate, crenate at apex; filaments half as long as perianth segments, connate and adnate to perianth to 1/3, entire, the outer triangular-subulate, the inner triangular and 3 times as broad as the outer; style not exserted; capsule about one-third as long as the perianth. May-June. (Plate XIII, Figure 3 a–c).

226 Gravelly argillaceous slopes in the lower mountain zone. — Centr. Asia: T. Sh.; Kara-tau. Described from Kuyukskie mountains. Type in Tashkent.

136. A. **eremoprasum** Vved. in Not. Syst. Herb. Horti Bot. Petrop. V (1924) 92. — Exs.: Herb. Fl. As. Med. No. 176.

Perennial; bulb ovoid, ca. 1 cm thick; outer tunics papery, grayish, more or less pitted and rugose; bulblets pitted; scape (10)–15–25 cm long, covered to the middle with smooth leaf sheaths; leaves 2, filiform, apparently semicylindric, canaliculate, smooth, withering before flowering; spathe persistent, one-fifth to one-tenth as long as the umbel, acuminate; umbel without bulblets, fasciculate, loosely few-flowered; pedicels unequal, 3–7 times the length of perianth, subtended by bracteoles; segments of the campanulate perianth dingy rose, with a dingy purple nerve, (5)–6–7 mm long, acute, the outer lanceolate, entire, the inner oblong-lanceolate, crenate, slightly gibbous at base, half as broad again at base as the outer; filaments two-thirds as long as perianth segments, connate and adnate to perianth up to the middle, entire, the outer narrowly triangular, the inner broadly triangular and 3 times as broad as the outer; style not exserted; capsule about half as long as the perianth. May-June.

Stony slopes in the lower mountain zone. — Centr. Asia: Pam.-Al.; known from a single location: the Zerabulakskie heights. Endemic. Described from the Zerabulakskie heights. Type in Tashkent.

137. A. **Popovii** Vved. in Trans. Sc. Soc. Turk. I (1923) 124. — Exs.: Herb. Fl. As. Med. No. 63.

Perennial; bulb ovoid, 1–1.5 cm thick; outer tunics commonly light brown, coriaceous, with prominent longitudinal crests, splitting at the top and at base; bulblets light brownish, crested and pitted; scape (15)–20–40 cm long, slender, covered up to or slightly above the middle with smooth leaf sheaths; spathe one-fourth to one-third as long as the umbel, acuminate, commonly persistent; umbel without bulblets, spherical or nearly so, rather many-flowered, loose; pedicels equal, 3–6 times as long as perianth, subtended by numerous bracteoles; segments of the subspherical perianth whitish, with a dingy purple nerve, smooth, ca. 3 mm long, subequal, oblong, acute, the outer scaphoid, slightly narrower than the inner; filaments slightly exceeding the perianth segments, at base connate and adnate to perianth, entire, equal, subulate; style exserted; capsule slightly shorter than the perianth. June.

Mottled outcrops, gravelly slopes, and takyrs. — Centr. Asia: Syr D.
227 (Dzhety-sai, Kurkat, SW foothills of Mogol-tau), Pam.-Al. (between Kabadian and Dzhelikul). Endemic. Described from Dzhety-sai. Type in Tashkent.

Note. Apart from those listed, there are records of the following localities: Syr D. (Mansur-ata between station of Chanak and Montaitash) and Pam.-Al. (Zeravshan heights). New material is needed from these locations, as the available material is incomplete and the identifications cannot be fully verified.

138. A. **confragosum** Vved. in Sched. ad Herb. Fl. As. Med. (1935) No. 619. — Exs.: Herb. Fl. As. Med. No. 341 (sub A. scrobiculato).

Perennial; bulb ovoid, 1–1.5 cm thick; outer tunics coriaceous, grayish-brown or blackish, pitted, splitting at base; bulblets blackish-brown,

tubercular-pitted; scape 15–30 cm long, slender, covered to 1/3 or up to the middle with smooth leaf sheaths; leaves 3 or 4, filiform, ca. 0.5 mm broad, semicylindric, canaliculate, smooth or scabrous-margined, slightly shorter than to equaling the scape; spathe one-third to one-half as long as the umbel, long-acuminate, commonly persistent; umbel without bulblets, hemispherical or often spherical, densely many-flowered; pedicels subequal, 2–4 times as long as perianth, subtended by numerous bracteoles; segments of the subspherical perianth tawny, in herbarium violet-tinged especially at the tips, ca. 3 mm long, equal, oblong-ovate, acute, the outer scaphoid, scabrous; filaments half as long again as perianth segments, at base connate and adnate to perianth, entire, equal, subulate; style exserted; capsule (nearly mature) slightly shorter than the perianth. May-June.

Rocks and gravelly slopes. — Centr. Asia: T. Sh. Known from several localities in Mogol-tau mountains. Endemic. Described from Spa. Type in Tashkent.

139. **A. scrobiculatum** Vved. in Transc. Sc. Soc. Turk. I (1923) 123.

Perennial; bulb ovoid, 0.75–1.5 cm thick; outer tunics blackish or brownish, coriaceous, pitted, splitting at base; bulblets apparently few, brown, pitted; scape 10–20 cm long, commonly stoutish, covered to 1/3 or nearly up to the middle with smooth leaf sheaths; leaves 3 or 4, filiform, ca. 0.5 mm broad, semicylindric, canaliculate, smooth, apparently equaling the scape; spathe one-fourth as long as the umbel, long-acuminate, commonly persistent; umbel without bulblets, hemispherical to spherical, rather many-flowered, fairly loose; pedicels equal, 4–6 times as long as perianth, the outer often ascending, subtended by numerous bracteoles; segments of the spherical perianth rosy-violet with a dingy purple nerve, 3–3.5 mm long, subequal, smooth, acutish, the outer scaphoid, oblong, slightly narrower than the oblong-ovate inner segments; filaments half as
228 long again as the perianth segments, at base connate and adnate to perianth, entire, equal, subulate; style exserted; capsule about two-thirds as long as the perianth. May.

Mottled outcrops, gravelly slopes, and solonchaks. — Centr. Asia: T. Sh. (Zakaratauskaya Plain, Chu-Ili Mountains). Endemic. Described from Ak-kul. Type in Tashkent.

140. **A. transvestiens** Vved. in Herb. Fl. As. Med. (1935) No. 619.

Bulb oblong-ovoid, 1–1.5 cm thick; outer tunics light brown, coriaceous, slightly pitted-rugose, sometimes smooth, in young (sterile) bulbs with longitudinal crests; bulblets numerous, light brown, tuberculate-pitted; scape 30–60 cm long, slender, covered to 1/5–1/4 with smooth leaf sheaths; leaves 3, semicylindric, canaliculate, fistulous, 1.5–2 mm broad, smooth, apparently much shorter than the scape, withering before flowering; spathe two-thirds as long as the umbel, acuminate, persistent; umbel without bulblets, spherical, densely many-flowered; pedicels equal, 2–3 times as long as perianth, subtended by numerous bracteoles; segments of the subspherical perianth pale lilac with a darker nerve, ca. 3 mm long, smooth, obtuse, the outer scaphoid, elliptic-oblong, the inner oblong-ovate; filaments half as long again as the perianth segments, at base connate and adnate to perianth, entire, equal, subulate; style exserted. June. (Plate XII, Figure 3 a–d).

Mottled outcrops. — Centr. Asia: Mtn. Turkm. Known from two places in the vicinity of town of Kara-kala. Endemic. Type in Tashkent.

141. A. **sabulosum** Stev. ex Bge in Goebel. Reise...II (1838) 311; Ldb. Fl. Ross. IV, 170; Boiss. Fl. Or. V (1884) 251 (p.p. exclus. spec. Bge); Shmal'g., Fl. II, 489. — Ic.: Rgl. Fl. turk. (1876) t.IX, f. 1–3.

Perennial; bulb oblong-ovoid, 1½–2 cm thick; outer tunics coriaceous, light brown, apparently crimped by distant concave parallel nerves, often torn along the nerves; bulblets light brown, irregularly tuberculate-pitted; scape 20–60 cm long, stout, apparently obliquely inflated, covered to 1/4 with smooth leaf sheaths; leaves 3 or 4, semicylindric, canaliculate, fistulous, 1–2 mm broad, smooth or rarely scabrous, shorter than the scape; spathe about as long as the umbel, acuminate, deciduous; umbel without bulblets, hemispherical or often spherical, rather densely many-flowered; pedicels 3–5 times as long as perianth, subtended by numerous bracteoles; segments of the hemispherical perianth greenish or brownish, green-nerved in fruit, cross-wrinkled, ca. 3 mm long, equal, elliptic, the outer scabrous, scaphoid, obtuse, the inner emarginate; filaments
229 slightly exceeding the perianth segments, at base connate and adnate to perianth, entire, equal, linear-subulate; style exserted; capsule ca. 3 mm long, with rounded scarcely emarginate valves. May-June.

Sand deserts. — European part: L.V.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Mtn. Turkm. (Kushkinskii River). **Gen. distr.**: Dzu.-Kash. Described from the northern shore of the Caspian Sea.

Note. The bulb tunics of A. sabulosum are somewhat variable: they are sometimes strongly fibrous, but by far the greater part of herbarium material is devoid of tunics and it is impossible to state anything definite concerning such specimens.

142. A. **turkestanicum** Rgl. in A.H.P. III (1875) 197. — A. nothum Vved. in Opred. rast. okr. Tashkenta I (1923) 66. — Exs. Herb. Fl. As. Med. No. 343. — Ic.: Rgl. Fl. turk. (1876) t.XV, f. 6–8.

Perennial; bulb subspherical, 1.5–3 cm thick; outer tunics papery, gray, nerveless; bulblets none; scape (40)–70–100 cm long, covered to 1/4 with smooth or very rarely scabrous leaf sheaths; leaves 4–6, linear, gradually attenuate from base, 2–10 mm broad, flat, scabrous-margined, much shorter than the scape, soon withering; spathe persistent, equaling the umbel, the beak as long as the blade; umbel without bulblets, spherical, densely many-flowered; pedicels subequal, (2)–3–4 times as long as perianth, subtended by bracteoles; segments of the broadly campanulate perianth rose, with a faint darker nerve, ca. 3 mm long, subequal, obtuse, the outer ovate scaphoid, the inner elliptic, narrowed toward base; filaments slightly exceeding to half as long again as the perianth segments, at base connate and adnate to perianth, the outer subulate from a triangular base, the inner subulate from a broadly oval obtusely 2-toothed base, twice as broad at base as the outer filaments and slightly broader than the perianth segments; style conspicuously exserted. June-July.

Chiefly mottled outcrops. — Centr. Asia: Ar.-Casp. (lower course of Sary-su River), Balkh. (Balkhash), T.Sh. (sporadically in the foothills from Alma Ata to Mogol-tau), Mtn. Turkm. (Sulyuklyu). Endemic. Described from Mogol-tau. Type in Leningrad.

Section 7. PORRUM Don. Mon. (1826) 4. — Bulb solitary, globose or ovoid, without rhizome; aerial part of scape covered to rather high up with leaf sheaths; perianth segments 1-nerved; inner filaments 3-parted, the filiform lateral cusps commonly exceeding the central antheriferous cusp; seeds angular.

143. A. **ferganicum** Vved. in Not. Syst. Herb. Horti Petrop. V (1924) 90. — A. Lehmannianum var. kokanicum Rgl. in A.H.P X (1887) 304.

230 Perennial; bulb ovoid, 0.5–1 cm thick; outer tunics papery, grayish; tunics of replacement bulb yellowish; bulblets few, large, dull, yellow, dorsally carinate; scape 10–20 cm long, covered at base with smooth approximate leaf sheaths; leaves 2–4, filiform, smooth, ca. 1 mm broad, apparently exceeding the scape; spathe one-half to two-thirds as long as the umbel, short-beaked, early deciduous; umbel without bulblets, hemispherical or often spherical, densely many-flowered; pedicels subequal, half as long again to three times as long as perianth, subtended by bracteoles; segments of the campanulate perianth rosy with a purple nerve, subequal, 4–6 mm long, acute, oblong-lanceolate; filaments slightly shorter than perianth segments, at base connate and adnate to perianth, not ciliate, the outer triangular-subulate, the inner as broad at base as perianth segments, 3-parted, the central segment two-thirds as long to equaling the oblong-triangular undivided part, equaling to half as long again as the lateral cusps; style not exserted; capsule valves orbicular, ca. 4 mm long. May.

Desert foothills. — Centr. Asia: Pam.-Al. Endemic. Described from the foothills of Alai and Turkestan ranges. Type in Leningrad.

144. A. **Lehmannianum** Merckl. in Mém. Acad. Pétersb. VII (1851) 509; Boiss. Fl. Or. V (1884) 234 (excl. var. Bungei Boiss.). — Ic.: Rgl. Fl. turk. t. VI, f. 8–10.

Perennial; bulb ovoid, ca. 0.75 cm broad; outer tunics papery, grayish-tawny or reddish-tawny; tunics of replacement bulb yellow; bulblets none; scape 5–7 cm long, covered at base with smooth approximate leaf sheaths; leaves 2 or 3, filiform, smooth, ca. 1 mm broad, exceeding the umbel; spathe early deciduous, half as long as the umbel, short-acuminate; umbel without bulblets, hemispherical or rarely spherical, relatively few-flowered; pedicels subtended by few bracteoles, subequal, $1\frac{1}{2}$–2–(3) times as long as perianth; segments of the campanulate perianth rosy, with a prominent purple nerve, smooth, equal, 6–7 mm long, lanceolate to oblong, acute, the inner slightly broader; filaments two-thirds as long to slightly shorter than perianth segments, connate and adnate to perianth to 1/4 their length, not ciliate, the outer triangular-lanceolate, the inner scarcely broader at base than perianth segments, 3-parted, the central cusp one-third as long as the oblong-triangular undivided part and one-half to two-thirds as long as the lateral cusps; style included; capsule valves orbicular, ca. 4 mm long, emarginate. May-June.

233 Clay deserts. Centr. Asia: Ar.-Casp., Kyz. K. Endemic. Described from deserts adjacent to Sea of Azov. Type in Leningrad.

(231)

Plate XIV

1. Allium dictyoprasum C.A.M., 1a) portion of perianth.– 2. A. brevidens Vved.; 2a) portion of perianth; 2b) bulb scale; 2c) and 2d) bulblets.– 3. A. Aucheri Boiss.; 3a) portion of perianth; 3b) bulb scale.

145. A. **Borszczowii** Rgl. in A.H.P. III (1875) 74. — Ic.: Rgl. Fl. turk. (1876) t. VI, f. 11-14.

Perennial; bulb oblong-ovoid, 1-1.5 cm thick; outer tunics reticulate-fibrous, brown; tunics of replacement bulb yellowish; bulblets few, large, elongated, yellow, reticulate-furrowed; scapes 10-30 cm long, commonly 2 or 3 from one bulb, rarely solitary or up to 5, at issue from sheaths recurved-ascending or rarely suberect, covered to 1/4-1/2 with glabrous approximate leaf sheaths; leaves 3-5, apparently fistulous, narrowly linear, glabrous, 1-2 mm broad, commonly exceeding the scape; spathe acuminate, much shorter than the umbel; umbel without bulblets, spherical or rarely fasciculate, commonly few-flowered, loose; pedicels subtended by bracteoles, unequal, 2-5 times as long as perianth; segments of the campanulate-hemispherical perianth rose with a darker nerve, subequal, 5-6 mm long, smooth, oblong-lanceolate to lanceolate, acute or obtuse; filaments three-quarters as long to slightly shorter than perianth segments, at base connate and adnate to perianth, not ciliate, the outer triangular-subulate, the inner as broad at base as perianth segmnts, 3-parted, the central cusp one-third to one-fourth as long as the triangular undivided part and one-third as long to slightly longer than the lateral cusps; style included; capsule valves subglobose, ca. 4 mm long, commonly with 2 cartilaginous apical teeth, forming in ovary a crest around the style. April-June.

Sands or rarely mottled outcrops. — Centr. Asia: Ar.-Casp., Kyz. K., Kara K., Mtn. Turkm., Amu D., Syr D. Endemic. Described from the Syr Darya Valley. Type in Leningrad.

Note. Plants from the southern part of Soviet Central Asia need further study on account of the short lateral cusps of the inner stamens and the frequent lack of crests in capsule, characteristics which bring them close to (if not actually identifiable with) the North Persian A. Boissieri Rgl.

146. A. **brevidens** Vved. in Not. Syst. Herb. Horti Petrop. V (1924) 89.

Perennial; bulb ovoid, 0.75-1.5 cm thick; outer tunics reticulate, brown; tunics of replacement bulb yellow, reticulately nerved; bulblets few, elongated, yellow, reticulately nerved; scape 20-30 cm long, covered to the middle with leaf sheaths, these scabrous or the upper ones smooth; leaves 2 or 3, fistulous semiterete, canaliculate, scabrous, 1-3 mm broad, slightly exceeding the umbel; spathe early deciduous, slightly shorter than the umbel, beaked, the beak half as long again as the blade; umbel without bulblets, spherical or rarely hemispherical, commonly many-flowered,
234 dense; pedicels subtended by bracteoles, 3-8 times the length of perianth, unequal, the inner up to twice as long as the outer; segments of the ovoid perianth whitish with a prominent dingy purple nerve, 3-4 mm long, acute, smooth, the outer carinate, oblong, the inner elliptic; filaments slightly exceeding the perianth, at base connate and adnate to perianth, not ciliate, the outer subulate from a triangular base, the inner as broad at base as perianth segments, 3-cleft, the central segment half as long again as the lateral segments and as the oblong-triangular undivided part; style conspicuously exserted; capsule valves orbicular, ca. 3.5 mm long. May-July. (Plate XIV, Figure 2, a-d).

Mottled outcrops. — Centr. Asia: Pam.-Al. Endemic. Described from Karatag and Rink. Type in Leningrad.

147. **A. turcomanicum** Rgl. in A.H.P. X (1887) 305, tab. I, f. 4.— Ic.: l.c.

Perennial; bulbs solitary or often in clusters of 2 or 3, ovoid, 1–1.5 cm thick; outer tunics reticulate, rufous-brown or brown; tunics of the replacement bulbs yellowish, reticulately nerved; bulblets few, large, elongated, yellow, smooth, lustrous; scape 30–100 cm long, covered to 1/3–1/2 with smooth leaf sheaths; leaves 4 or 5, fistulous, semiterete (?), smooth, 2–6 mm broad, much shorter than the scape; spathe early deciduous; umbel without bulblets, spherical, rather densely many-flowered; pedicels subtended by bracteoles, 3–5 times the length of perianth, unequal, the inner half as long again as the outer; segments of the ovoid perianth rosy-violet, 5–6 mm long, subequal, acute, linear-lanceolate to lanceolate, smooth, the outer carinate; filaments barely exceeding the perianth segments, at base connate and adnate to perianth, ciliate at base, the outer subulate from a broadly triangular base, at base scarcely broader than perianth segments, 3-cleft, the central segment approximately equaling the lateral segments and the oblong-triangular undivided part; style scarcely exserted; capsule valves suborbicular, cross-wrinked, ca. 3.5 mm long. April-May.

Argillaceous and sandy soils.— Centr. Asia: Kara K., Mtn. Turkm., Pam.-Al. Endemic. Described from the area between Kalaburun and Abdullakhan near Murgab south of Merv. Type in Leningrad.

148. **A. crystallinum** Vved. in Bull. Univer. As. Centr. 19 (1934) 126.

Perennial; bulb ovoid, ca. 2 cm thick; outer tunics subcoriaceous, reticulate, grayish-brown; tunics of the replacement bulb yellow, reticulate; bulblets few, large, yellow, reticulately nerved, densely crystalline-tuberculed; scape 60 cm long, covered to 1/3 with smooth leaf sheaths; leaves 2, fistulous, terete, smooth, 3–5 mm broad, shorter than the scape;
235 spathe early deciduous; slightly longer than the umbel, the beak about as long as the blade; umbel without bulblets, many-flowered; pedicels 2–3 times the length of perianth, subtended by bracteoles; segments of the ovoid-campanulate perianth whitish with a reddish nerve, smooth, acute, 5 mm long, the outer carinate, oblong-lanceolate, slightly shorter than the linear-lanceolate inner segments; filaments slightly shorter than perianth segments, at base connate and adnate to perianth, slightly ciliate at base, the outer triangular-subulate, the inner slightly broader at base than perianth segments, 3-cleft, the central segment half as long as the lateral segments and the oblong-triangular undivided part; style included. May.

Juniper woods.— Centr. Asia: Pam.-Al. Endemic. Collected on a single occasion by Lepeshkin in a juniperetum in Ketmenchapta Range near Aulata. Type in Tashkent.

149. **A. filidens** Rgl. in A.H.P. III (1875) 174.— A. karakense Rgl. in A.H.P. III (1875) 76.— A. Ugami Vved. in Trans. Sc. Soc. Turk. I (1923) 123.— A. margaritaceum auct. Fl. As. Med.— Ic.: Rgl. Fl. turk. t. XV, 11–13.

Perennial; bulb ovoid, 1–2 cm thick; outer tunics brown, reticulate-fibrous, clasping the scape base; tunics of replacement bulb yellowish; bulblets few, yellowish to dark brown, large, elongated, smooth, lustrous; scape 20–60 cm long, covered at base with smooth approximate leaf sheaths;

leaves 3 or 4, fistulous, semiterete, canaliculate, smooth or slightly scabrous, 1–3 mm broad, much shorter than the scape; spathe deciduous, as long to half as long again as the umbel, the beak about as long as the blade; umbel without bulblets, spherical or hemispherical, densely many-flowered; pedicels subtended by bracteoles, subequal, 2–5 times the length of perianth; segments of the ovoid-campanulate perianth greenish-azure, often drying rosy, with a prominent green nerve, subequal, 4–5 mm long, smooth, the outer carinate oblong obtusish, the inner oboblong-ovate to oboblong, obtuse and mucronulate; filaments equaling or slightly shorter than perianth segmetns, at base connate and adnate to perianth, ciliate at base, the outer triangular-subulate, the inner half as broad again at base as perianth segments, 3-cleft, the central segment half as long as the ovate-triangular undivided part and 2/7 to 2/3 as long as the lateral segments; style included; capsule valves orbicular, ca. 4 mm long, emarginate. May-June.

Gravelly slopes in the lower mountain zone, chiefly on mottled outcrops. — Centr. Asia: Ar.-Casp. (Sary-su), Kyz. K., Amu D., Syr D., Pam.-Al., T. Sh. Described from Mogol-tau. Type in Leningrad.

236 150. **A. dictyoscordum** Vved. in Not. Syst. Herb. Horti Bot. Petrop. V (1924) 90.

Perennial; bulb ovoid, 2–2.5 cm thick; outer tunics reticulate, brown, clasping the scape to high up; tunics of replacement bulb yellowish; bulblets none; scape (sometimes 2 from one bulb) 50–70 cm long, covered at base with smooth approximate leaf sheaths; leaves 4–6, not toothed, linear, canaliculate, conspicuously scabrous-margined, 3 mm broad, much shorter than the scape; spathe slightly exceeding the umbel, the beak as long as the blade; umbel without bulblets, spherical, rarely hemispherical, dense, commonly many-flowered; pedicels subtended by bracteoles, half as long again to 3 times as long as flowers, subequal; segments of the ovoid-campanulate perianth whitish, with a green nerve, subequal, 5–6 mm long, linear-oblong, obtuse or obtusish, the outer cuneate scabrous; filaments about equaling the perianth segments, at base connate and adnate to perianth, not ciliate, the outer triangular-subulate, the inner about twice as broad at base as perianth segments, 3-cleft, the central segment half as long as the ovate-triangular undivided part and half the length of the lateral segments; style included; capsule valves nearly rounded, ca. 5 mm long, scarcely emarginate. May-June.

Saline clays in the lower mountain zone. — Centr. Asia: Mtn. Turkm. Endemic. Described from Germab. Type in Leningrad.

151. **A. viride** Grossh. in Fl. Kavk. I (1928) 201.

Perennial; bulb tunics reticulate-fibrous, produced into a collar 2–3 times the length of the bulb; scape 70–150 cm long, cinereous-pruinose; leaves hollow, semiterete, abruptly attenuate toward apex, 6–11 mm broad, up to 40 cm long; spathe early deciduous; umbel without bulblets, ovaloid-spherical, dense, 3.5–4 cm in diameter; pedicels very unequal, 3–5 times the length of perianth; segments of the oblong-ovaloid perianth dull green, narrowly white-margined, very obtuse, smooth, 3–5 mm long; filaments exceeding the perianth segments, glabrous or rarely sparsely ciliate, the peripheral shorter than the central, either not cuspidate or with 1 or 2 short lateral cusps, the inner with 3 equal cusps.

Caucasus: Tal. Endemic.

Note. The author has not seen a single specimen of this species

152. **A. dictyoprasum** C.A.M. ex Kunth Enum. IV (1843) 390; Ldb. Fl. Ross. IV, 166; Boiss. Fl. Or. V (1884) 243.

Perennial; bulb ovoid, 2–2.5 cm thick; outer tunics brown, reticulate, clasping the stem base to high up; tunics of replacement bulb yellowish; bulblets few, large, yellow, elongated, reticulate-nerved, mostly absent;
237 scape 60–100 cm long, covered to 1/3 with smooth leaf sheaths; leaves 3 or 4, fistulous, terete, attenuate toward apex, smooth, 3–5 mm broad, much shorter than the scape; spathe about as long as the umbel, short-beaked; umbel without bulblets, spherical, densely many-flowered; pedicels subtended by bracteoles, 2–3 times the length of perianth, unequal, the central twice as long as the peripheral; segments of the oblong-ovoid perianth dark purple or brownish-green, with a darker nerve, smooth, ca. 3 mm long, unequal, the outer scaphoid, broadly elliptic, very obtuse, much shorter than ovate emarginate inner segments; filaments half as long again as perianth segments, at base connate and adnate to perianth, slightly ciliate at base, the outer triangular-subulate, the inner narrower at base than perianth segments, 3-cleft, the central segment slightly shorter than the linear-triangular base and half as long as to slightly longer than the lateral segments; style conspicuously exserted; capsule valves nearly rounded, 3.5 mm long, scarcely emarginate. June-July. (Plate XIV, Figure 1, a).

Dry stony places. — Caucasus: S. Transc. Endemic. Described from Armenia. Cotype in Leningrad.

153. **A. vineale** L. Sp. pl. (1753) 299; Ldb. Fl. Ross. IV, 163; Boiss. Fl. Or. V (1884) 235; Shmal'g. Fl. II, 486. — Ic.: Rchb. Ic. Fl. Germ X (1848) f. 1075. — Exs.: Pl. Finl. exs. No. 573.

Perennial; bulb ovoid, 1.5–2 cm thick; outer tunics grayish-brown, papery, more or less lacerate; tunics of replacement bulb yellowish; bulblets yellowish, lustrous, smooth; scape 40–80 cm long, covered to 1/3 or up to the middle with smooth leaf sheaths; leaves 3 or 4, fistulous, semiterete, canaliculate, smooth, 2–4 mm broad, much shorter than the scape; spathe about as long as the umbel, long-beaked, early deciduous; umbel with or rarely without bulblets, few- or many-flowered, sometimes flowerless; pedicels several times the length of perianth, subequal, subtended by bracteoles; segments of the ovoid perianth rose or purple, with a darker nerve, 3–4.5 mm long, obtuse, smooth, the outer oblong, carinate, slightly broader than the oblanceolate inner segments, at base connate and adnate to perianth, slightly ciliate at base, the outer subulate, the inner slightly broader at base than the perianth segments, 3-cleft, the central segment two-thirds as long as or just slightly shorter than the lateral segments and slightly shorter than to as long as the linear-triangular undivided part; style conspicuously exserted; capsule valves elliptic, ca. 4 mm long, narrowly and shallowly emarginate. July-August.

Mountain meadows; in European part as a weed. — European part: M. Dnp., Crim.; Caucasus: E. and S. Transc. **Gen. distr.**: W. Eur., Asia Minor, N. America (naturalized). Described from Germany.

238 154. A. Aucheri Boiss. Diagn. pl. or. 1.7 (1846) 116; Boiss. Fl. Or. V (1884) 237. — A. brevipes Ldb. Fl. Ross. IV (1853) 165. — A. ledschanense Conrath et Freyn in Bull. Herb. Boiss. VI (1896) 190.

Perennial; bulb ovoid, ca. 1 cm thick; outer tunics dark gray, subcoriaceous, splitting; tunics of replacement bulb yellowish; bulblets none; scape 40–70 cm long, covered up to or somewhat above the middle with smooth or slightly scabrous leaf sheaths; leaves 2–(4), fistulous, apparently semiterete, canaliculate, smooth or slightly scabrous, ca. 3 mm broad, short, far from reaching the umbel; spathe often purple-tinged, one-half to two-thirds as long as the umbel, beakless, acuminate; umbel without bulblets, spherical or rarely hemispherical, mostly many-flowered, dense to subcapitate; pedicels ebracteolate, the peripheral half the length of to rarely equaling or to half as long again as perianth, the central as long to twice as long as perianth; segments of the tubular-campanulate perianth equal, 7–9 mm long, purplish-rose, turning bluish in drying, with a dingy purple nerve, oblong-lanceolate, very acute, smooth or sometimes crenate at apex; filaments half as long as perianth segments, at base connate and adnate to perianth, ciliate at base, the outer triangular-subulate, the inner as broad at base as perianth segments, 3-cleft, the central segment one-fourth the length of ovate-triangular undivided part and one-third to one-half as long as the lateral segments; style included; capsule valves elliptic, ca. 6 mm long, slightly emarginate. June-July. (Plate XIV, Figure 3a, b).

Subalpine meadows. — Caucasus: E. and S. Transc. Gen. distr.: Asia Minor, N. Persia. Described from Armenia and Gilan.

Note. As far as can be deduced from the very detailed description of A. ledschanense, this species differs from A. Aucheri solely in its leaves not being fistulous. Taking into account how difficult it is sometimes to establish this character on dry material, I am of the opinion that an error occurred in this case and that that these species cannot be distinguished.

155. A. guttatum Stev. in Mém. Soc. Nat. Mosc. 18 (1809) 173, tab. II, f. 1; Ldb. Fl. Ross. IV (1853) 165. — A. margaritaceum var. guttatum Gay in Ann. Sc. Nat. 3. VIII (1847) 223; Boiss. Fl. Or., V (1884) 240; Shmal'g., Fl. II, 487. — Ic.: Stev. l.c.

Perennial; bulb ovoid, 1–1.5 cm thick; outer tunics gray or brownish, papery, slenderly parallel-nerved, sometimes separated into fibers at the top; tunics of replacement bulb whitish; bulblets solitary (?), large, smooth, grayish; scape 30–60 cm long, slender, covered to 1/3–1/2 with smooth leaf sheaths; leaves 3 or 4, fistulous, semiterete, canaliculate, scabrous, 1.5–3 mm broad, much shorter than the scape; spathe about as
239 long as the umbel, early deciduous, with beak twice the length of blade; umbel without bulblets, densely many-flowered, spherical or rarely hemispherical; pedicels several times the length of perianth, unequal, the central up to twice as long as the outer, very slender, thickened below the flower, the long scarious bracteoles subtending the peripheral pedicels nearly the length of pedicel and surrounding the base of the umbel; segments of the narrowly campanulate perianth ca. 2.5 mm long, whitish, with a faint dingy green nerve and dark violet (brownish green in drying) spot at center, smooth, obtuse, the outer subcarinate, oboblong, the inner oboblong-linear,

slightly narrower and slightly longer than the outer; filaments one-fourth as long again as perianth segments, at base connate and adnate to perianth, glabrous, the outer subulate, the inner broader at base than perianth segments, 3-cleft, the central segment one-half to two-thirds as long as filiform lateral segments and two-thirds as long to as long as the linear-triangular undivided part: style slightly exserted; capsule valves broadly elliptic, narrowly emarginate, ca. 3 mm long. June-July.

Steppes, sands and hills. — European part: Bl., Crim.; Caucasus: E. Transc. (?). Gen. distr.: Bal.-As. Min., described from the lower Dniester. Cotype in Leningrad.

Note. Recorded for E. Transcaucasia according to Wilhelms' collections. The author has not seen these specimens and considers the occurrence of this species anywhere in Transcaucasia as most unlikely.

156. A. **affine** Ldb. Fl. Ross. IV (1853) 166. — A. margaritaceum var. affinne Rgl. in A.H.P. III (1875) 50; Boiss. Fl. Or. V (1884) 240. — A. margaritaceum var. scabrum Rgl. l.c. — A. Mishtschenkoanum Grossh. in Grossh. et Schishk. Pl. or. exs. (1924) No. 4. — Exs.: Pl. or. exs. No. 352.

Perennial; bulb ovoid, 1–2 cm thick; outer tunics gray, papery; tunics of replacement bulb yellowish; bulblets solitary (?), large, smooth; yellowish; scape (20) 30–80 cm long, covered to the middle with scabrous or rarely smooth leaf sheaths; leaves 3–5, fistulous, semiterete, canaliculate, scabrous, 2–4 mm broad, much shorter than the scape; spathe twice as long as the umbel, early deciduous, the beak 3–4 times the length of blade; umbel without bulblets, densely many-flowered, spherical, very rarely hemispherical; pedicels 3–4 times the length of perianth, usually unequal, the central twice as long as the peripheral, very slender, thickened below the flower; bracteoles of the outer pedicels long, sometimes equaling the pedicels, often capillary, scarious, surrounding the base of the umbel; segments of the narrowly campanulate perianth ca. 4 mm long, whitish, with a prominent green nerve, smooth, obtuse, the outer carinate, oblong, the inner oblong-linear, slightly narrower and longer than the outer; filaments 1/4–1/3 as long again as
240 perianth segments, at base connate and adnate to perianth, ciliate at base, the outer subulate, the inner broader at base than the perianth segments, 3-cleft, the central segment half as long as the filiform lateral segments and barely shorter than the linear-triangular undivided part; style exserted; capsule valves elliptic or obovate, narrowly emarginate, ca. 5 mm long. June-August.

Dry slopes. — Caucasus: Dag., E. and S. Transc., Tal. Gen. distr.: Iran. Described from Georgia. Type in Leningrad.

157. A. **firmotunicatum** Fom. in Monit. Jard. Bot. Tiflis 14 (1909) 48.

Perennial; bulb ovoid-globose; tunics coriaceous, indurated, more or less separated at the top into parallel strips; bulblets yellowish-brown, finely tuberculate; scape to 60 cm long, covered to the middle with leaf sheaths; leaves fistulous, terete, sulcate, scabrous, shorter than the scape; spathe long-beaked, early deciduous; umbel hemispherical or sometimes subspherical; pedicels vinaceous-red, unequal, the central twice as long, 4–5 times the length of perianth, subtended by bracteoles; segments of the

trigonous-campanulate perianth vinaceous-red suffused with a raspberry tinge, connivent, oval-oblong, obtuse, 3–5 mm long, the outer prominently carinate, scabrous on the keel, intensely colored; filaments exceeding the perianth segments, dilated at base, the outer entire, the inner 3-cleft, the central segment two-thirds as long as the lateral segments; style exserted. June.

Dry places. — Caucasus: E. Transc. Endemic (?). Described from Mil'skaya Steppe.

Note. The author has not a single specimen of this species.

158. A. **fuscoviolaceum** Fomin in Monit. Jard. Bot. Tiflis 14 (1909) 50. — Exs.: Pl. orient. No. 56.

Perennial; bulb ovoid, 0.75–1.5 cm thick; outer tunics papery, gray; tunics of replacement bulb yellowish; bulblets solitary (?), large, yellowish, smooth, lustrous; scape 30–70 cm long, covered to 1/3 with smooth leaf sheaths; leaves 3 or 4, fistulous, semiterete, canaliculate, usually scabrous-margined, 2–3 mm broad, much shorter than the scape; spathe half as long as the umbel, short-beaked; umbel without bulblets, spherical or often hemispherical, densely many-flowered; pedicels subequal or the central ones half as long again, 2–3 times as long as perianth, subtended by bracteoles; segments of the oblong-ovoid perianth ca. 4 mm long, dark or rarely light purple, with a darker nerve, oblong, subequal, smooth, the outer obtuse and carinate; filaments slightly exceeding the perianth segments, at base connate and adnate to perianth, ciliate, the
241 outer subulate, the inner as broad at base as perianth segments, 3-cleft, the central segment about as long as the lateral segments and half the length of the narrowly linear-triangular undivided part: style exserted; capsule valves broadly elliptic, ca. 4 mm long, shallowly emarginate. July-August.

Dry slopes. — Caucasus: Cisc., Dag., E. and S. Transc. **Gen. distr.:** Iran. Described from Sarykamysh. Type in Tiflis.

159. A. **sphaerocephalum** L. Sp. pl. (1753) 297; Ldb. Fl. Ross. IV, 165 (excl. spec. transcauc.); Boiss. Fl. Or. V (1884) 236; Shmal'g., Fl. II, 486. — A. descendens auct. Fl. Ross. — Ic.: Rchb. Ic. Fl. Germ. X (1848) f. 1080. — Exs.: Fl. Hung. exs. No. 793.

Perennial; bulb ovoid, 0.75–2 cm thick; outer tunics coriaceous, brown, entire, splitting; tunics of replacement bulb yellowish; bulblets few or absent (?), elongated, yellowish, lustrous, smooth; scape 30–80 cm long, covered to 1/3 with smooth leaf sheaths; leaves 3–5, fistulous, semiterete, canaliculate, smooth, rarely scabrous-margined, 2–4 mm broad, much shorter than the scape; spathe half as long as the umbel, cuspidate; umbel without bulblets, spherical or oblong, rarely fasciculate-hemispherical, densely many-flowered; pedicels unequal, the central commonly twice as long as the peripheral, equaling to many times as long as perianth, the peripheral subtended by bracteoles; segments of the oblong-ovoid perianth ca. 4 mm long, rose or purple, with a darker nerve, very rarely whitish, oblong, the outer carinate, more or less scabrous, acutish, slightly shorter and narrower than the obtuse inner segments; filaments slightly exceeding to one-fourth as long again as perianth segments, at base connate and adnate to perianth, ciliate at base, the outer subulate, the inner as broad at base as perianth segments, 3-cleft, the central segment as long

as the lateral segments and (half) two-thirds the length of the undivided part; style conspicuously exserted; capsule valves elliptic, ca. 4 mm long, scarcely emarginate, with cartilaginous teeth. June-July.

Steppes, mounds, and slopes. — European part: U. Dnp., M. Dnp., V.-Don, Bl., L. Don, L. V. (?); Caucasus: Cisc. Gen. distr.: S. and Centr. Eur., Asia Minor (?), N. Afr. (?). Described from Italy.

Note. A. descendens L. is distinguished, apart from other characters, by the leaves being carinate beneath. Study of live material has finally settled the problem concerning the occurrence of this species in the USSR. The A. descendens form cycle also contains the species A. artvinense reported by Mishchenko.

160. **A. Regelianum** Beck. ex Iljin in Fl. Yugo-Vost. III (1929) 355 et 356, Figure 178. — A. descendens var. tenuifolium Miscz. ex Grossh., Fl. Kavk. I (1928) 252. — Ic.: Fl. Yugo-Vost., l.c.

Perennial; bulb ovoid, 0.75–1 cm thick; outer tunics subcoriaceous,
242 grayish-brown, entire, splitting; tunics of replacement bulb yellowish-brown; bulblets numerous, small, semiovoid, yellowish-brown or often brown, dull due to the prominent nerves; scape 30–60 cm long, covered to 1/3 with smooth leaf sheaths; leaves 3 or 4, fistulous, semiterete, canaliculate, smooth, 2 mm broad, much shorter than the scape; spathe deciduous, much shorter than the umbel; umbel without bulblets, fasciculate-oblong, densely many-flowered; pedicels unequal, the peripheral nearly the length of perianth, subtended by bracteoles, the central 4 times as long, ebracteolate; segments of the ovoid perianth subequal, ca. 4 mm long, purple, with a darker nerve, obtuse; smooth, the outer carinate, oblong to oblong-lanceolate; filaments equaling to slightly exceeding the perianth, at base connate and adnate to perianth, glabrate, the outer subulate, the inner as broad at base as perianth segments, 3-cleft, the central segment slightly shorter than the lateral segments and one-third to one-half the length of the linear-triangular undivided part; style conspicuously exserted; capsule valves elliptic, ca. 3 mm long, scarcely emarginate, crested. August.

Solonetz soils. — European part: Bl., L. Don., L. V.; Caucasus: Dag.* Endemic. Described from Krasnoarmeisk. Type in Leningrad.

161. **A. scorodoprasum** L. Sp. pl. (1753) 297 excl. var. β; Ldb. Fl. Ross. IV, 163; Boiss. Fl. Or. V (1884) 232; Shmal'g., Fl. II, 486. — Ic.: Rchb. Ic. Fl. Germ. X (1878) f. 1073. — Exs.: Hayek. Fl. stir. exs. —

Perennial; bulb ovoid, 1–2 cm thick; outer tunics tawny, subcoriaceous, friable; tunics of replacement bulb dark violet; bulblets small, numerous, smooth, dark violet; scape 40–80 cm long, covered to 1/3 with smooth leaf sheaths; leaves 3–5, linear, not fistulous, gradually attenuate, scabrous on the margin and on midrib, very short, barely exceeding the middle of the scape, 4–10 mm broad; spathe longer than the umbel, early deciduous, the beak up to twice the length of blade; umbel with violet bulblets, rather many-flowered, very rarely flowerless; pedicels twice the length of perianth, equal, subtended by bracteoles; segments of the ovoid-campanulate perianth ca. 5 mm long, purple with a darker nerve, acute, scabrous, the outer oblong, carinate, slightly narrower than the oblong-

* Derbent, Becker – needs confirmation.

ovate inner segments; filaments slightly shorter than perianth segments, at base connate and adnate to perianth, ciliate at base, the outer subulate, the inner twice as broad at base as perianth segments, 3-cleft, the central segment half as long as the lateral segments and one-third the length of the oblong-triangular undivided part; style included. June-July.

243 Meadows, among shrubs. — European part: U. Dnp., M. Dnp., V.-Don, Bl., Crim.; Caucasus: Cisc. (Kislovodsk, Akinfiev). Gen. distr.: W. Eur., Asia Minor. Described from Europe.

162. **A. longicuspis** Rgl. in A. H. P. III (1875) 45. — A. sativum auct. fl. As. Med. — Ic.: Rgl. Fl. turk. (1876) t. VI, f. 1–3.

Perennial; bulb ovoid, 1–2 cm thick; replacement bulbs 2–4; outer tunics grayish-brown, papery to subcoriaceous; tunics of replacement bulbs grayish-rose; bulblets none; scape 40–100 cm long, covered to the middle with smooth leaf sheaths; leaves 4–7, not fistulous, broadly linear, smooth or scabrous at margin and on midrib beneath, 5–10 mm broad, much shorter than the scape; spathe 3–4 times as long as the umbel, deciduous, the strong beak up to 4 times the length of blade; umbel with large (5–10 mm) violet bulblet interspersed with and exceeded by numerous scarious bracteoles, many-flowered, ovoid, rather dense; pedicels filiform, several times the length of flower, unequal, the central ones to 3 times as long; segments of the ovoid perianth rose, sometimes dark rose, lustrous, smooth, equal, ca. 3 mm long, acute, the inner ovate, the outer oblong; filaments initially shorter than, finally up to half as long again as perianth segments, at base connate and adnate to perianth, not ciliate, the outer triangular-subulate, the inner as broad at base as perianth segments, 3–(5)-cleft, the central segments about twice the length of the oblong undivided part, one-third to one-half as long as the lateral segments, sometimes toothed; style conspicuously exserted. July-August.

Gullies shaded during the day. — Centr. Asia: Mtn. Turkm., Pam.-Al., T. Sh. Endemic. Described from Tak. Type in Leningrad.

Note. A. longicuspis Rgl. represents a wild race of A. sativum L. (garlic) and is distinguished by the exserted anthers. As in many other species with bulbiferous umbels, the flowers apparently do not always open and, in that case, the anthers are included. Observations,on this species under cultivation are desirable.

In plants from Mountainous Turkmenia the stamens are somewhat less exserted, but the author did not have enough material with well developed flowers to ascertain whether this is a general characteristic.

(163). **A. sativum** L. Sp. pl. (1753) 296; Shmal'g., Fl. II, 486. — Ic.: Syreishch., Ill. Fl. Mosk. gub. I (1806) 237.

Perennial; bulb ovoid, consisting of 6–10 bulbils; scape up to 1 mm long, often annularly curved in upper part before flowering; leaves flat, linear; spathe long-beaked; umbel bearing numerous bulblets; perianth

244 whitish; filaments shorter than perianth, the inner with long lateral cusps. A cultivated plant. Propagated by cloves, as it hardly produces any seeds.

Economic importance. Cultivated in the European part of the USSR, in the Caucasus and in the Far East, for the sake of the preservable bulbs. It has medicinal use in the treatment of arteriosclerosis. In addition to garlic oil, the plant also contains the glucoside allin.

164. **A. Fominianum** Miscz. ex Grossh. et Schischk. Pl. orient. exsicc. (1924) No. 80. — A. Fominii Miscz. in herb. — A. ampeloprasoides Grossh. in Grossh. et Schischk. l. c. (1924) No. 31. — Exs.: Pl. or. exs. No. 80.

Bulb ovoid, 1–1.5 cm thick; outer tunics subcoriaceous, brown, obscurely parallel-nerved; splitting; tunics of replacement bulb dark purplish-violet; bulblets few, often absent, brown, dull, slenderly nerved; scape 20–60 cm long, covered to 1/4 with smooth leaf sheaths; leaves (2) 3 or 4, not fistulous, linear, canaliculate, scabrous- or rarely smooth-margined, 2–3 mm broad, much shorter than the scape; spathe soon deciduous; umbel without bulblets, spherical or rarely hemispherical, many-flowered; pedicels subequal, half as long again to twice as long as perianth segments, subtended by bracteoles; segments of the spherical-campanulate perianth whitish, sometimes more or less suffused with purple on the back, with a green or purple nerve, ca. 4 mm long, obtuse, scabrous, the outer oblong, carinate, more or less crenate on the keel, two-thirds as broad and barely shorter than the ovate inner segments; filaments equaling the perianth segments, at base connate and adnate to perianth, ciliate at base, the outer linear-subulate, the inner as broad at base as perianth segments, 3-cleft, the central segment one-fourth to one-third the length of the ovate-triangular undivided part and half as long as the lateral segments; style scarcely exserted; capsule valves suborbicular, ca. 4 mm long. May-July.

Rocks and stony slopes. — Caucasus: E. Transc. Endemic. Described from Tiflis. Type in Baku.

Note. Most closely related to A. ponticum, and the labels suggest that it is a more easterly ecological race, associated with rocks and stony slopes. There is need to distinguish these species in the field, since the characters provided by Grossheim (Fl. Kavk., l. c.) for identification of A. Fomini, A. ampeloprasoides and A. ponticum are quite inadequate.

165. **A. ponticum** Miscz. ex Grossh., Fl. Kavk. I (1928) 206.

Perennial; bulb ovoid, 1–1.5 cm thick; outer tunics subcoriaceous, splitting; tunics of replacement bulb dark purple or reddish-brown; bulblets absent (?); scape 10–70 cm long, covered to 1/4 with smooth leaf sheaths;
245 leaves 3 or 4, not fistulous, linear, canaliculate, smooth or rarely scabrous-margined, 2–5 mm broad, much shorter than the scape; spathe soon deciduous; umbel without bulblets, spherical or rarely hemispherical, many-flowered; pedicels unequal, 2–3 times the length of perianth, subtended by bracteoles; segments of the spherical-campanulate perianth dark purple, ca. 4 mm long, obtuse, spherical, the outer oblong, carinate, two-thirds as broad as the broadly ovate inner segments; filaments as long as or slightly shorter than perianth segments, at base connate and adnate to perianth, ciliate at base, the outer linear-subulate, the inner as broad at base as perianth segments, 3-cleft, the central segments one-third the length of the ovate-triangular undivided part and half as long as the lateral segments; style scarcely exserted; capsule valves suborbicular, ca. 4 mm long. May-July.

Dry slopes. — Caucasus: E. and W. Transc. Endemic. Described from Transcaucasia. Type in Leningrad.

166. A. gracilescens Somm. et Lev. A.H.P. XIII (1893) 51.

Perennial; bulb ca. 1 cm thick; outer tunics grayish-brown, subcoriaceous; splitting; tunics of replacement bulb reddish-brown; bulblets...; scape ca. 50 cm long, covered to 1/3 with smooth leaf sheaths; leaves 3, not fistulous, linear, apparently canaliculate, smooth or slightly scabrous-margined, 3–4 mm broad, much shorter than the scape; spathe early deciduous; umbel without bulblets, hemispherical, loose; pedicels subequal, 3–3½ times the length of perianth, subtended by bracteoles; segments of the spherical-campanulate perianth light rose, 4–5 mm long, obtuse, scabrous, the outer oblong, carinate, two-thirds as broad as the ovate inner segments; filaments barely shorter than perianth segments, at base connate and adnate to perianth, ciliate at base, the outer linear-subulate, the inner as broad at base as perianth segments, 3-cleft, the central segment one-third the length of the ovate-triangular undivided part and two-fifths to one-half as long as the outer segments; style not exserted. June.

Caucasus: W. Transc. Endemic. Described from Adzharia: Keda. Type in Florence.

Note. A species most closely related to A. Fominianum and A. ponticum, and possibly one of these should yield its place to A. gracilescens as the species endowed with priority rights. Beside the authentic plant, which the author had the opportunity of seeing, there are no other herbarium specimens.

Sommier and Levier describe their species as having light rose flowers and they do not confuse their species with A. ponticum, since the latter species of their collections (Chula), which retains it dark purple color up to the present time, has been referred by them to A. rotundum. The authentic A. gracilescens plant has faded to such an extent that it is
246 quite impossible to determine the original color of its flowers; the author is not therefore in a position to establish its identity with A. ponticum which it approaches more closely in its loose umbel and westerly origin. Neither can he, in view of these considerations, identify A. gracilescens with A. Fominianum.

All this obliges the author to retain for the time being all the three species as distinct, while drawing the attention of Caucasian botanists to the foregoing statements. See also the author's note to A. Fominianum.

167. A. erubescens C. Koch. in Linnaea XXII (1849) 242.— A. rudbaricum Boiss. et Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 215; Boiss. Fl. Or. V (1884) 240.— A. rotundum ssp. gramineum Miscz. in herb.— Exs.: Pl. or. exs. No. 32.

Perennial; bulb ovoid, (0.5)–1–1.5 cm thick; outer tunics brown to grayish-brown, coriaceous, splitting; separated into fibers in upper part; tunics of replacement bulb purplish-tawny; bulblets few, small, brown, nearly smooth; scape 20–40 cm long, covered to 1/3–1/2 with smooth leaf sheaths; leaves 3 or 4, not fistulous, linear, canaliculate, smooth or scabrous-margined, 2–5 mm broad, much shorter than the scape; spathe early deciduous, as long as the umbel, the beak half as long to nearly as long as the blade; umbel without bulblets, spherical or rarely hemispherical, dense, commonly many-flowered; pedicels subtended by bracteoles, unequal, the peripheral half as long again as or rarely shorter than the

perianth, the central to 3 times as long as perianth; segments of the campanulate perianth rose, with a purple nerve, 5–7 mm long, acute, scabrous, the outer lanceolate, sometimes slightly longer than the oblong linear segments, carinate, more or less crenate on the keel, sometimes with slightly reflexed tips; filaments two-thirds to three-quarters as long as perianth segments, at base connate and adnate to perianth, slightly ciliate at base, the outer triangular-subulate, the inner as broad at base as perianth segments, 3-cleft, the central segment one-fourth to one-third the length of undivided part and one-third to one-half as long as the lateral segments; style included; capsule valves broadly oval, ca. 5 mm long. June-July.

Meadows and among shrubs. — European part: Crim. (rare); Caucasus: Cisc.; Dag., E. Transc., Tal. Gen. distr.: N. Persia. Described from Dag.: Kuba. Type in Berlin.

168. **A. rotundum** L. Sp. pl. (1762) 423; Ldb. Fl. Ross. IV, 164 (p. p.); Boiss. Fl. Or. V (1884) 233; Shmal'g., Fl. II, 487 (p. p.). — A. cilicicum Boiss. Diagn. pl or. I, 7 (1846) 115; Boiss. Fl. Or. V (1884) 242. — A. rotundum ssp. scoroprasoides Miscz. in herb.

Perennial; bulb ovoid, 0.75–2 cm thick; outer tunics brown to blackish-brown, coriaceous, splitting, more or less separated into fibers in upper
247 part: tunics of replacement bulb blackish-brown; bulblets rather numerous, small, brown, nearly smooth; scape 20–50 cm long, covered to 1/3 with smooth leaf sheaths; leaves 3–5, not fistulous, linear, canaliculate, scabrous- or smooth-margined, 2–5–(7) mm broad, much shorter than the scape; spathe early deciduous, slightly longer than the umbel, the beak about as long as the blade; umbel without bulblets, spherical, rarely hemispherical, dense, often compact to subcapitate; pedicels subtended by bracteoles, as long as to rarely twice the length of perianth, the central ones twice as long to rarely 5 times as long as perianth; segments of the broadly campanulate perianth ca. 5 mm long, subequal, scabrous, the outer dark purple, with a darker nerve, carinate, more or less crenate on the keel, oblong, obtuse to subobtuse, the inner paler and often nearly white, with a purple nerve, elliptic, very obtuse; filaments three-quarters as long as perianth segments, at base connate and adnate to perianth, ciliate at base, the outer triangular-subulate, the inner as broad at base as perianth segments, 3-cleft, the central segment one-fourth to one-third the length of the oblong-triangular undivided part and two-fifths as long as the lateral segments; style included. June-July.

European part: Bl., Crim; Caucasus: Cisc., E., W. and S. Transc., Tal. Gen. distr.: Centr. and S. Eur., Asia Minor, N. Iran. Described from S. Europe.

Note. A somewhat forced attempt is here made to distinguish species within A. rotundum s. l. The author distinguishes these species chiefly by the color and shape of perianth segments. Because of the nature of the mostly badly collected material, he has been unable to make use of such very important characters in the systematics of alliums as bulb tunics and bulblets. A most substantial difficulty also consists in the almost complete lack of ecological data on the labels of Crimean and Caucasian material.

It is very likely that A. rotundum s. l. forms various local races in the Crimea and the Caucasus. The study of these forms can be successfully attempted only with specially collected material.

169. A. **jajlae** Vved. in Bull. Univer. As. Centr. 19 (1934) 126. — A. rotundum ssp. melleum Miscz. in herb.

Perennial; bulb ovoid, 1–1.5 cm thick; outer tunics grayish-brown; subcoriaceous, separating into fibers in upper part; tunics of replacement bulb blackish-brown; bulblets few, small, brown, nearly smooth; scape 20–40 cm long, covered to 1/3–1/2 with smooth leaf sheaths; leaves 3–5, not fistulous, linear-canaliculate, scabrous-margined, 3–5 mm broad, much shorter than the scape; spathe early deciduous, twice as long as the umbel, the beak somewhat longer than blade; umbel without bulblets,
248 spherical, dense, often subcapitate; pedicels subtended by bracteoles, unequal, the peripheral about as long as or slightly longer than perianth, the central to 3 times as long; segments of the ovate-campanulate perianth rosy-violet, with a darker nerve, subequal, ca. 5 mm long, scabrous, the outer carinate, crenate on the keel, oblong, acutish or obtusish, the inner oblong-ovate, obtuse to subobtuse; filaments about two-thirds to three-quarters as long as perianth segments, at base connate and adnate to perianth, ciliate at base, the outer triangular-subulate, the inner as broad at base as perianth segments, 3-cleft, the central segment one-fourth to one-third the length of the oblong-triangular undivided part and two-fifths as long as the lateral segments; style included; capsule valves broadly ovate, ca. 3 mm long, scarcely emarginate. June-July.

Mountains. — European part: Crim.; Caucasus: E. and S. Transc. Gen. distr.: Asia Minor. Described from Crimea, Nikitskaya Yaila. Type in Leningrad.

Note. I distinguish this species within A. rotundum s.l. chiefly by the compact subcapitate rose-flowered umbels. It might possibly be more correct to regard all the Crimeo-Caucasian rose-flowered material of this cycle as a separate species, irrespective of umbel compactness.

170. A. **Waldsteinii** Don. Mon. (1826) 17. — A. rotundum Ldb. Fl. Ross. IV (1853), 164 (p.p.); Shmal'g. Fl. II, 487 (p.p.). — A. paterfamilias Boiss. in Diagn. pl. or. nov. II, 4 (1859) 114 (?).

Perennial; bulb ovoid, 1–2 cm thick, outer tunics brown, coriaceous, splitting; tunics of replacement bulb dark purple; bulblets numerous, small, blackish-purple; scape (30)–40–70 cm long, covered to 1/3 or nearly to the middle with smooth leaf sheaths; leaves 4 or 5, not fistulous, linear, canaliculate, smooth or scabrous-margined, 3–7–(10) mm broad, much shorter than the scape; spathe early deciduous, slightly longer than the umbel, the beak as long to half as long again as blade; fruiting umbel spherical or rarely hemispherical, densely many-flowered; pedicels subtended by bracteoles, unequal, the peripheral half as long again to twice as long, the central 3–5 times as long as perianth, rarely in depauperate specimens the peripheral as long and the central twice as long as perianth; segments of the ovate-pyramidal perianth dark purplish-violet with a darker nerve, (4)–5 mm long, subequal, scabrous, the outer carinate, crenate on the keel, oblong, acute, the inner oblong-ovate, acutish to obtusish or
251 mucronate; filaments two-thirds to three-quarters as long as perianth segments, at base connate and adnate to perianth, ciliate, the outer triangular-subulate, the inner as broad at base as perianth segments, 3-cleft, the central segment one-third to one-fourth the length of the oblong-triangular undivided part and half as long as the lateral segments; style

Plate XV

1. Allium alaicum Vved., 1a) portion of perianth.– 2. A. Candolleanum Alb.; 2a) portion of perianth.– 3. A. monophyllum Vved.; 3a) portion of perianth.– 4. A. verticillatum Rgl.; 4a) capsule; 4b) lower part of leaves.

included; capsule valves suborbicular, ca. 4 mm long, scarcely emarginate. June-July.

Meadows and slopes, often as weed. — European part: U. V., V.-Ka., U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim., L. Don; L. V.; Caucasus: Cisc., Dag., E., W. and S. Transc. Gen. distr.: Centr. and S. (?) Eur. Described from Hungary.

171. **A. talyschense** Miscz. ex Grossh., Fl. Kavk. I (1928) 204.

Perennial; bulb ovoid, 0.75–1.5 cm thick; outer tunics light brown, subcoriaceous, separating into fibers especially at the top; tunics of replacement bulb yellowish; bulblets few, small, yellowish, lustrous, nearly smooth; scape 15–30 cm long, covered to 1/3 with leaf sheaths; leaves 3 or 4, not fistulous, linear, canaliculate, scabrous, ca. 3 mm broad, much shorter than the scape; spathe deciduous, slightly shorter than the umbel, the beak about one-third the length of blade; umbel without bulblets, spherical or rarely hemispherical, densely many-flowered; pedicels subequal, half as long again to twice as long as perianth, subtended by bracteoles; segments of the broadly campanulate perianth nearly white, with a prominent dingy purple nerve, subequal, 5 mm long, acute, very scabrous, the outer carinate, crenate on the keel, oblong-lanceolate, the inner oblong-ovate; filaments slightly shorter than perianth segments, at base connate and adnate to perianth, slightly ciliate at base, the outer triangular-lanceolate, the inner about as broad at base as perianth segments, 3-cleft, the central segment about one-third the length of the ovate-triangular undivided part and half as long as the lateral segments; style included; capsule valves suborbicular, ca. 4 mm long. June.

Dry rocky places. — Caucasus: Tal. Endemic.

172. **A. pseudoampeloprasum** Miscz. ex Gross., Fl. Kavk. I (1928) 204 et in herb.!

Perennial; bulb ovoid, ca. 2 cm thick; outer tunics...; tunics of replacement bulb yellowish; bulblets numerous, elongated, yellowish, lustrous, smooth; scape 50–60 cm long, covered to 1/3 with smooth leaf sheaths; leaves 5, not fistulous, linear, canaliculate, smooth, 6–7 mm broad; spathe early deciduous; umbel without bulblets, spherical densely many-flowered; pedicels unequal, the central about twice as long as the peripheral, many times as long as perianth, subtended by numerous
252 bracteoles; segments of the ovoid perianth rosy with a dingy purple nerve, 3.5 mm long, acute, scabrous, the outer lanceolate, longer than the oblong-lanceolate inner segments; filaments about twice as long as perianth segments, at base connate and adnate to perianth, ciliate at base, the outer triangular-subulate, the inner 3-cleft, scarcely broader at base than perianth segments, the central segment the length of the oblong-triangular undivided part and scarcely longer than the lateral segments; style conspicuously exserted; capsule valves broadly elliptic, scarcely emarginate, ca. 4 mm long. June-July.

Dry clay slopes. — Caucasus: E. Transc. Endemic. Described from Shorbulag near Erivan. Type in Leningrad.

173. **A. atroviolaceum** Boiss. Diagn. pl. Or. nov. I 7 (1846) 112; Boiss. Fl. Or. V (1884) 240. — A. ampeloprasum var. atroviolaceum Rgl.

in A.H.P. III (1875) 54; Shmal'g., Fl. II, 488. — A. atroviolaceum var. caucasicum Somm. et Lev. in A.H.P. XVI (1900) 427. — A. ampeloprasum auct. — Exs.: HFR No. 1191; Herb. Fl. As. Med. No. 332.

Perennial; bulb ovoid-globose, $1\frac{1}{2}$–$2\frac{1}{2}$ cm thick; outer tunics grayish-brown, fibrous, obscurely reticulate, clasping the scape base to high up; tunics of replacement bulb yellowish; bulblets numerous, drab or yellowish, dull; scape 60–100 cm long, covered to 1/4–1/2 with smooth leaf sheaths; leaves 4 or 5, broadly linear, 2–10 mm broad, not fistulous, scabrous at margin and on the keel, attenuate toward apex, shorter than the scape; spathe soon deciduous, the beak several times the length of blade; umbel without bulblets, spherical, densely many-flowered; pedicels unequal, the central twice as long, 3–6 times the length of perianth, the peripheral subtended by bracteoles; segments of the ovoid-campanulate perianth dark purplish-violet, rarely dingy greenish, subequal, 3–4 mm long, lustrous, obtuse, the outer carinate, more or less scabrous, oblong-ovate, the inner ovate; filaments one-fourth to one-half as long again as perianth segments, at base connate and adnate to perianth, ciliate at base, the outer entire, triangular-subulate, the inner as broad at base as perianth segments, 3-cleft, the central segment about one-half to two-thirds the length of the undivided part and one-half to two-thirds as long as the lateral segments; style included; capsule slightly exceeding the perianth. June-August.

Dry slopes, rocks, and among field crops. — European part: Crim.: Caucasus: Cisc., Dag , E., W. and S. Transc.; Centr. Asia: Mtn. Turkm., Syr D. Gen. distr.: Iran. Described from vicinity of Shiraz. Cotype in Leningrad.

174. **A. leucanthum** C. Koch. in Linnaea 22 (1849) 240. — A. ampeloprasum var. leucanthum Ldb. Fl. Ross. IV (1853) 164;
253 Boiss. Fl. Or. V (1884) 232. — A. firmotunicatum var. album Grossh. in Grossh. et Schischk. Pl. or. exs. (1924) No. 5. — Exs:: l.c.

Perennial; bulb ovoid-globose, 2–3 cm thick; outer tunics grayish-brown, fibrous; tunics of replacement bulb yellowish; bulblets numerous, yellowish, dull; scape 50–120 cm long, covered to 1/4–1/3 with smooth leaf sheaths; leaves 4–7, broadly linear, not fistulous, carinate, 3–9 mm broad, scabrous, much shorter than the scape; spathe early deciduous; umbel without bulblets, subspherical, densely many-flowered; pedicels unequal, the central twice as broad, 2–8 times the length of perianth, the peripheral subtended by bracteoles, the central ebracteolate; segments of the ovoid-campanulate perianth white with a green nerve, 3–3.5 mm long, obtuse to acutish, the inner elliptic, the outer carinate, scabrous, oblong-ovate; filaments one-fourth as long again as perianth segments, at base connate and adnate to perianth, ciliate, the outer entire triangular subulate, the inner somewhat broader at base than perianth segments, 3-cleft, the central segment two-thirds as long as the lateral segments and two-thirds the length of the undivided part; style exserted; capsule slightly exceeding the perianth. June-July.

Dry places and among field crops. — Caucasus: E. and S. Transc. Endemic (?). Described from Shirvan Steppe. Type in Berlin.

Note. Closely related to A. atroviolaceum and needs further study.

175. **A. ampeloprasum** L. Sp. pl. (1753) 294; Boiss. Fl. Or. V (1884) 232 (exclus. var. β.). — Ic.: Rchb. Ic. Fl. Germ. X (1848) f. 1072. — Exs.: Soc. Etude Fl. Fr.-Helv. No. 1546.;

Perennial; bulb ovoid-globose, 2–4 cm thick; outer tunics almost papery, slightly fibrous; tunics of replacement bulb yellowish; bulblets numerous, yellowish, finely furrowed underneath the coat, rather dull; scape 50–80 cm long, covered to 1/3 with smooth leaf sheaths; leaves 6–9, broadly linear, not fistulous, 5–10 mm broad, carinate, smooth or scabrous-margined, much shorter than the scape; spathe early deciduous; umbel without bulblets, spherical, loosely many-flowered; pedicels unequal, the central twice as long, 4–8 times the length of perianth, subtended by bracteoles; segments of the broadly ovoid-campanulate perianth rose, ca. 5 mm long, oblong, acutish, scabrous, the outer carinate; filaments barely exceeding the perianth segments, at base connate and adnate to perianth, ciliate at base, the outer entire, triangular-subulate, the inner as broad at base as perianth segments, 3-cleft, the central segment half as long as the lateral segments and the oblong-triangular undivided part; style exserted; capsule scarcely exceeding the perianth. June.

254 A weed. — Centr. Asia: Pam.-Al. (southern piedmonts of Kugitang). **Gen. distr.**: Atl. Eur., Centr. Eur., W. Med., Bal.-As. Min., Iran. Described from the East and from England.

(176) **A. porrum** L. Sp. pl. (1753) 294. — A. ampeloprasum var. porrum Rgl. in A.H.P. III (1875) 54; Shmal'g., Fl. II, 488. — Ic.: Syreishch., Ill. Fl. Mosk. gub. I (1906) 237.

Annual; bulb without or with few bulblets; scape arising from the center of the bulb; leaves linear-lanceolate; spathe long-beaked; umbel large, spherical; perianth whitish or rarely rosy, with slightly scabrous segments; filaments barely exceeding the perianth segments, the inner 3-cleft, the central segment half the length of the undivided part. A cultivated plant.

Economic importance. Cultivated chiefly in the European part for the edible scape bases, mostly as a truck crop in the vicinity of large towns.

Section **MOLIUM** Don. Mon. (1826) 72. — Bulb solitary, without rhizome, globose or ovoid; leaf sheaths usually buried; leaves always flat; pedicels ebracteolate; perianth segments 1-nerved; filaments entire or cuspidate, the cusps short or long, but never exceeding the anthers; seeds angular.

177. **A. monanthum** Maxim. in Bull. Acad. Pétersb. XXXI (1887) 109. — Ic.: Kom., Opred. rast. Dal'nevost. kraya I (1931) 365, t. 112, f. 3.

Perennial; bulb globose, 0.5–1 cm thick; tunics grayish-brown, almost papery; scape 5–15 cm long, one-half to two-thirds as long as the leaves, slender, weak, enveloped at base together with leaves by a hyaline sheath; leaves 1 or 2, linear, 2–4–8 mm broad, gradually narrowed toward both ends, subacute; spathe scarious, sometimes colored, acuminate, slightly shorter than the umbel; umbel 1–2–(3)–flowered; pedicels shorter than to equaling the perianth, slightly thickened and enlarged under the flower; segments of the broadly campanulate perianth rose, 4–5 mm long, oblong, obtusish; filaments three-quarters as long as perianth segments, connate and adnate to perianth 1/3, triangular-subulate; style included; stigma 3-lobed; ovules 6. April-May.

Grassy mountain slopes and woods. — Far East: Uss. — Gen. distr.: Jap.-Ch. Described from the Sidemi River. Type in Leningrad.

178. A. **paradoxum** (MB.) Don. Mon. (1826) 72; Ldb. Fl. Ross. IV (1853) 186; Boiss. Fl. Or. V (1884) 257; Shmal'g., Fl. II, 491. — Scilla paradoxa MB. Fl. taur. cauc. III (1819) 267. — Exs.: Herb. Fl. cauc. No. 163.

Perennial; bulb globose, ca. 1 cm thick; tunics grayish-black, papery;
255 scape sharply triquetrous, 20–30 cm long, enveloped at base together with leaves by a leafless sheath; leaf solitary, linear, 0.5–1–2.5 cm broad, carinate, gradually narrowed from the middle to base, subacute; spathe acuminate, about two-thirds the length of blade; umbel 2–5–10-flowered, often bearing bulblets; pedicels half as long again as perianth; flowers nodding; segments of the broadly campanulate perianth ca. 10 mm long, subequal, oblong, acute; filaments one-third as long as perianth, connate and adnate to perianth to 1/4 their length, triangular-subulate, subequal; style included; stigma 3-lobed; ovules 6; capsule half as long as perianth. May.

Shady woods. — Caucasus: Dag., E. Transc., Tal.; Centr. Asia: Mtn. Turkm. (W. Kopet Dagh). Gen. distr.: N. Persia. Described from Georgia. Type in Leningrad.

179. A. **Candolleanum** Alb. in Tr. Tifl. Bot. Sada I (1895) 240.

Perennial; bulb subglobose, 0.75–1.5 cm broad; tunics gray, papery; scape terete, slender, 20–30 cm long; leaves 2 or 3, narrowly linear, 3–7 mm broad, gradually narrowed toward both ends, nearly smooth-margined, acute, slightly shorter than the scape; spathe about one-half to two-thirds as long as the umbel, acuminate; umbel with or without bulblets, fasciculate, few-flowered; pedicels unequal, two-thirds as long to slightly shorter than perianth, ebracteolate; flowers subnutant; segments of the broadly campanulate perianth to subspherical perianth white suffused with rose, 10–12 mm long, obtuse, the outer elliptic, the inner oblanceolate-elliptic; filaments about half as long as perianth, at base connate and adnate to perianth, triangular-subulate, the inner half as broad again; style included; ovules 6. June. (Plate XV, Figure 2 a).

Subalpine and alpine meadows. — Caucasus: E. Transc. Endemic. Described from Kutysh.

180. **A. oreophilum** C.A.M. in Verz. Cauc. (1831) 37.; Ldb. Fl. Ross. IV (1853) 188. — A. platystemon Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 514. — A. Ostrovskianum Rgl. in A.H.P. VII (1881) 545. — A. oreophilum var. Ostrovskianum Rgl. in A.H.P. X (1887) 356. — Ic.: Rgl. in Gartenfl. (1873) t. 775, f. 1–3. — Exs.: Herb. Fl. As. Med. No. 62.

Perennial; bulb ovoid-globose, 1–1.5–(2) cm thick; tunics gray, papery; scape 5–20 cm long, covered to 1/2–3/4 with a buried sheath; leaves 2, linear, 2–8 mm broad, scabrous-margined, greatly exceeding the umbel; spathe one-half to two-thirds as long as the umbel, short-acuminate; umbel fasciculate or often hemispherical to spherical, relatively few-flowered, loose; pedicels subequal, half as long as to often somewhat longer than perianth, ebracteolate; segments of the broadly campanulate perianth

256 rosy-purple with a darker nerve, 8–11 mm long, oval, obtuse or often acute; filaments one-third to one-half as long as perianth segments, connate and adnate to perianth for half their length, the outer triangular-lanceolate, the inner broadly triangular; style included; stigma nearly 3-lobed; ovules 6; capsule ca. 4 mm in diameter. July-August.

Gravelly slopes in the upper mountain zone. — Caucasus: Dag.; Centr. Asia: Dzu.-Tarb., Pam.-Al., T. Sh. Endemic. Described from Dagestan, Tufandag. Type in Leningrad.

181. A. **gypsaceum** M. Pop. et Vved. in Not. Syst. Herb. Horti Petrop. V (1924) 92.

Perennial; bulb ovoid-globose, 1–1.5 cm thick; tunics grayish, papery; scape 7–20 cm long, covered to the middle with buried leaf sheaths; leaves 2 or 3, linear, 2–5 mm broad, scabrous-margined, greatly exceeding the scape; spathe about half as long to nearly as long as the umbel; umbel fasciculate-hemispherical, hemispherical or rarely spherical, relatively many-flowered, dense; pedicels equal, as long to $1\frac{1}{2}$–2 times as long as perianth, ebracteolate; segments of the campanulate perianth dingy purple, purple-nerved, more intensely colored toward apex, 10–11 mm long, the outer segments oblong-linear, acute, slightly longer and broader than the oblanceolate crenate obtusish inner segments; filaments half as long as perianth, connate and adnate to perianth for half their length, scarcely united above, the outer lance-subulate, the linear broader, triangular; ovary sessile, smooth, 6-ovuled. May-June. (Plate XVI, Figure 1 a).

Chiefly mottled outcrops. — Centr. Asia: Pam.-Al. (sporadically in S. part). Endemic. Described from Kugitang mountains. Type in Tashkent.

182. A. **helicophyllum** Vved in Bull. Univ. As. Centr. 19 (1934) 127.

Perennial; bulb subglobose, 1.5–2 cm thick; tunics papery, blackish; scape stumpy, stout, 5–8 mm thick, 10–20 cm long; leaves 5 or 6, linear, ca. 3 mm broad, glaucous, glabrous, scabrous-margined, shorter than the umbel, the upper third spirally twisted; spathe one-fourth as long as the umbel, acuminate; umbel fasciculate-hemispherical or hemispherical, loosely many-flowered; pedicels unequal, the central ones up to twice as long, many times the length of perianth (to 9 cm long), stout, thickened below the flower; segments of the stellate perianth pale rosy-violet, with a prominent green or dingy green nerve, linear-oblong, obtusish, 5 mm long, recurved after anthesis, more or less twisted; filaments slightly shorter than perianth segments, at base connate and united to perianth, slightly united above, subulate from triangular base, the base of inner filaments half as broad
257 again; ovary sessile, scabrous, 6–7-ovuled; capsule globose, ca. 5 mm in diameter. May-June.

Gravelly slopes and mottled outcrops. — Centr. Asia: Mtn. Turkm. (Kara-Kala, Prokhladnoe, Sulyuklyu). Endemic. Described from vicinity of Kara-Kala. Type in Tashkent.

183. A. **Sergii** Vved. in Bull. Univ. As. Centr. 19 (1934) 127.

Perennial; bulb ovoid, 0.75–1 cm thick; tunics gray, papery, enclosing 1 or 2 large yellowish-tawny smooth dull bulblets; scape 10–12 cm long, slender, covered to 1/3–1/2 with a buried leaf sheath; leaves commonly

solitary, very rarely 2, narrowly linear, (1) 2–3 (4) mm broad, canaliculate, glaucous, helicoid, smooth or scabrous-margined, glabrous, equaling the umbel; spathe short-acuminate, one-third to one-half as long as the umbel; umbel commonly hemispherical, rarely fasciculate, loosely few-flowered; pedicels 3–4 times the length of perianth, ebracteolate, the outer slightly ascending; segments of the stellate perianth pale rose with a purple nerve, 4 mm long, lanceolate, obtuse, at length recurved and twisted; filaments barely shorter than perianth, at base connate and adnate to perianth, equal, subulate from triangular base; ovary sessile, scabrous, 7–9-ovuled. May.

Gravelly slopes. — Centr. Asia: T. Sh. (Kara-tau). Endemic. Described from Uch-uzen. Type in Moscow.

184. **A. Eugenii** Vved. in Bull. Univer. As. Centr. 19 (1934) 127.

Perennial; bulbs ovoid, 1–1.5 cm thick; tunics grayish, papery; scape covered to about the middle with 2 sheaths, of these one leafless; leaf solitary, linear, 2–7 mm broad, greatly exceeding the umbel, the lower part beneath and the aerial part of sheath covered with retrorse, the upper and distal part of the blade glabrous; spathe apparently beakless, much shorter than the umbel; umbel hemispherical to subspherical, relatively few-flowered, loose; pedicels many times the length of perianth, ascending, ebracteolate; segments of the stellate perianth rose, with a prominent purple nerve, 4 mm long, linear-oblong, obtuse, at length recurved and twisted; filaments three-quarters as long as perianth segments, at base adnate to perianth, slightly united above, subulate from broadly triangular base, the base of inner filaments somewhat broader; capsule subglobose, ca. 3 mm in diameter.

Gravelly slopes, at altitudes of 1500–1700 m. — Centr. Asia: Mtn. Turkm. (Bol'shoi Balkhan). Endemic. Described from mountains of Bol'shoi Balkhan Range: Kosha-kudzhuk. Type in Leningrad.

258 185. **A. verticillatum** Rgl. in A.H.P. VI (1880) 518. — A. Pallasii var. verticillatum Rgl. in A.H.P. III (1875) 102. — Exs.: Herb. Fl. As. Med. No. 315.

Perennial; bulb ovoid, 0.75–1.5 cm thick; tunics grayish, papery; scape 10–20 cm long, covered to 1/4 with 1 or 2 approximate sheaths; leaf shorter than the scape, dissected down to sheath into 3–9 filiform furrowed scabrous pseudoverticillate segments; spathe short-beaked, slightly shorter than to as long as the umbel; umbel subspherical or hemispherical, relatively many-flowered, loose; pedicels unequal, the central sometimes up to twice as long, 3–7 times the length of perianth, the peripheral ascending, ebracteolate; segments of the stellate perianth rose, with a purple nerve, ca. 4 mm long, oblong-lanceolate, obtuse, at length recurved and twisted; filaments slightly exceeding the perianth, at base adnate to perianth, united above into a ring, subulate from triangular base; ovary subsessile, scabrous, 8–10-ovuled; capsule globose, ca. 3 mm in diameter. May-June. (Plate XV, Figure 4 a–b).

Small-grained and gravelly slopes in foothills and lower mountain zone. — Centr. Asia: Pam.-Al. (W.); T. Sh. (W. and SW). Endemic. Described from Kara-tau mountains. Type in Leningrad.

186. A. **aroides** M. Pop. et Vved. in Bull. Univer. As. Centr. 19 (1934) 128.

Perennial; bulb ovoid, 1–2 cm thick; tunics grayish, coriaceous, splitting, enclosing a solitary large lustrous yellowish bulblet; scape ca. 20 cm long, shorter than leaves; leaves 2, linear, 0.5–1 cm broad, scabrous at margin and on veins, withered at anthesis; spathe slightly shorter than to as long as the umbel, the beak long and herbaceous (especially when young); umbel hemispherical or spherical, relatively few-flowered, loose; pedicels subequal, 3–5 times the length of perianth, ebracteolate; segments of the stellate perianth greenish (rose-tinged in the herbarium), with a dingy purple or dingy green nerve, ca. 4 mm long, linear-oblong, obtuse, at length recurved and twisted; filaments barely shorter than perianth segments, at base adnate to perianth, united above into a ring, subulate from triangular base, the base of inner filaments up to twice as broad; ovary subsessile, 6- or 7-ovuled. May.

Stony and small-grained slopes in the lower mountain zone. — Centr. Asia: Pam.-Al. (sporadically in the W. part). Endemic. Described from Zeravshan Range: Maidan-ata. Type in Tashkent.

Note. Readily distinguishable from other species related to A. verticillatum by the coriaceous bulb tunics and the long herbaceous beak of the spathe, reminiscent when young of the unopened spathe of aroids.

259 187. **A. monophyllum** Vved. in Bull. Univer. As. Centr. 19 (1934) 128.

Perennial; bulb globose, 1–1.5 cm thick; tunics grayish, papery; scape buried in the soil nearly up to the umbel, 5–10 cm long, much shorter than the leaf; leaf solitary, linear-lanceolate, 3–11 mm broad, acute, scabrous-margined; spathe two-thirds as long as to slightly shorter than the umbel, short-acuminate; umbel hemispherical, rather few-flowered; pedicels equal, slightly exceeding to half as long again (or even twice as long) as perianth, ebracteolate; segments of the substellate perianth dingy violet or rose-violet, with a darker nerve, 5–6 mm long, linear, obtusish, erect after anthesis; filaments two-thirds as long as perianth segments, at base connate and adnate to perianth, the outer subulate; capsule (immature) two-thirds as long as perianth. July. (Plate XV, Figure 3, a).

Stony places on the summits of central Kopet Dagh. — Centr. Asia: Mtn. Turkm. **Gen. distr.**: N. Iran — Khurasan. Described from Iondar. Type in Leningrad.

188. A. **Derderianum** Rgl. in A. H. P. III (1975) 242. — A. haemanthoides var. lanceolatum Boiss. Fl. Or. V (1884) 276.

Perennial; bulb subglobose, 1–1.5 cm thick; tunics grayish, papery; scape rather stout, 5–10 cm long, shorter than the leaves, buried in the soil up to the middle; leaves 2, linear-lanceolate, 5–10 mm broad, scabrous-margined; spathe half as long as the umbel, short-acuminate; umbel hemispherical or spherical, many-flowered; pedicels about half as long to half as long again (in fruit to $2\frac{1}{2}$ times as long) as perianth; segments of the substellate perianth white, with a violet nerve, 8–13 mm long, linear, acute, erect after anthesis, rigid; filaments one-third to one-half as long as perianth segments, at base connate and adnate to perianth, triangular-subulate; capsule half as long as the perianth. May.

Dry slopes — Caucasus: S. Transc. (?). Gen. distr.: Iran. Described from N. Iran. Type in Leningrad.

Note. Reported for S. Transcaucasia, from which the author has not seen any specimens.

189. A. Alexejanum Rgl. in A.H.P. III (1875) 244. — Ic.: Rgl. Fl. turk. (1975) t. XVI, f. 4–6.

Perennial; bulbs subglobose, 1.5–2 cm thick; tunics blackish, papery; scape rather stout, 10–20 cm long, shorter than the leaves, buried in the soil up to the middle; leaves (1) 2 or 3, lanceolate, oblong to elliptic, 2–5 cm broad; spathe one-third to one-half as long as the umbel, short-acuminate; umbel hemispherical or rarely spherical, many-flowered;
260 pedicels (2)–3–5 times the length of perianth, ebracteolate; segments of the substellate perianth rose, with a purple nerve, 7–8 mm long, linear-lanceolate, acute, erect after anthesis, rigid; filaments about two-thirds as long to slightly shorter than perianth segments, at base connate and adnate to perianth, the outer subulate, the inner half as broad again, triangular-subulate; capsule about half as long as the perianth. May-July.

Gravelly and stony slopes in the middle and upper mountain zone. — Centr. Asia: Pam.-Al. Endemic. Described from Zeravshan Valley. Type in Leningrad.

190. A. akaka Gmel. ex Roem. et Schult. Syst. VIII (1830) 1132; Ldb. Fl. Ross. IV, 187; Boiss. Fl. Or. V (1884) 275. — A. latifolium Jaub. et Sp. Ill. Or. II (1844–46) tab. 103.

Perennial; bulb globose, 1.5–2.5 cm thick; tunics blackish, papery; scape rather stout, 5–15 cm long, shorter than the leaves, buried in the soil up to the middle; leaves (1) 2, oblong to elliptic, scabrous-margined, 2–6 cm broad; spathe one-third to one-half as long as the umbel, short-acuminate; umbel fasciculate-hemispherical or hemispherical, many-flowered; pedicels equal, slightly exceeding to half as long again (in fruit 2–3 times as long) as the perianth; segments of the substellate perianth linear, 7–8 mm long, acutish, rosy with a darker nerve, erect after anthesis, rigid; filaments half as long as perianth segments, at base connate and adnate to perianth, triangular-subulate; capsule half as long as the perianth. May-June.

Dry stony places. — Caucasus: E. and S. Transc. Gen. distr.: Arm. Kurd., Iran. Described from Gilan.

191. A. materculae Bordz. in Zap. Kiev. O-va Est. XXV, 1 (1915) 73.

Perennial; bulb subglobose, 1–2 cm thick; tunics gray to blackish, papery; scape stout, 10–30 cm long, shorter or longer (?) than the leaves, buried at base in the soil; leaves 2–4, glaucous, linear-lorate, 1–2 cm broad, scabrous-margined; spathe half as long as the umbel, short-acuminate; umbel fasciculate, many-flowered; pedicels unequal, 2–8 times the length of perianth, lilac, with a reddish nerve, 5–9 mm long, linear, acutish, erect after anthesis, rigid; filaments slightly shorter than perianth segments, at base connate and adnate to perianth, triangular-subulate; capsule about half as long as the perianth April-May.

Dry places. — Caucasus: S. Transc. Endemic. Described from Nakhichevan. Type in Kiev.

261 192. **A. Christophii** Trautv. A.H.P. IX (1884) 268. — A. albopilosum Wright. in Gard. Chron. XXXIV (1903) 34. — Ic.: Rgl. in A.H.P. X (1887) t. VII, f. 1.

Perennial; bulb globose, ca. 2 cm thick; tunics gray, papery; scape rather stout, 5–15 cm thick, 15–40 cm long, buried at base in the soil, about as long as the leaves; leaves 3–7, lorate, 5–25 mm broad, glaucescent, erect, covered beneath especially at margin with stiff spreading hairs, very rarely glabrate; spathe (one-fourth) one-third to one-half as long as the umbel, short-acuminate; umbel fasciculate-hemispherical, rarely spherical, loosely many-flowered; pedicels subequal, slightly exceeding to 3–5-several times the length of perianth segments, ebracteolate; segments of the substellate perianth purplish-violet or rosy-violet, 10–15–(18) mm long, linear-triangular, very acute, erect after anthesis, rigid; filaments half as long as perianth, at base connate and adnate to perianth, equal, linear-subulate from enlarged base; capsule ca. 5 mm in diameter. May-June.

Soft mountain slopes, chiefly in the lower mountain zone. — Centr. Asia: Mtn. Turkm. Endemic. Described from vicinity of Ashkhabad. Type in Leningrad.

193. **A. Bodeanum** Rgl. in A.H.P. III (1875) 238. — A. Walteri Rgl. in A.H.P. X (1887) 357, t. VII, f. 3.

Perennial; bulb globose, 1–2 cm thick; tunics blackish, papery; scape relatively slender (not more than 5 mm thick), 10–20 cm long, buried at base in the soil, shorter than the leaves; leaves 1–2–(4), linear-lanceolate, 1–2 cm broad, spreading, glabrous, sometimes scabrous at margin and beneath; spathe half as long as the umbel, short-acuminate; umbel fasciculate or hemispherical, loosely many-flowered; pedicels equal, 2–3 times the length of perianth, ebracteolate; segments of the substellate perianth rosy-violet, 10–14 mm long, linear-triangular, acute, erect after anthesis; filaments two-thirds as long as perianth segments, at base connate and adnate to perianth, equal, rather abruptly linear-subulate from enlarged base. May.

Gravelly and stony slopes in the steppe belt. — Centr. Asia: Mtn. Turkm. **Gen. distr.**: Iran. Described from Persia. Type in Leningrad.

Note. Very closely related to A. Christophii and in need of further study. The position of an allium collected by Chernyakovskaya in Seamasur, closely related to both species and mentioned in the Flora of Turkmenistan (II (1932) 290), has not so far been clarified.

194. **A. brachyscapum** Vved. in Bull. Univer. As. Centr. 19 (1934) 129. — Ic.: Fl. Turkmen. II, Figure 104.

Perennial; bulb globose, 1.5–2 cm thick; tunics gray, papery; scape
262 ca. 10 cm long, stumpy, buried in the soil to the middle or nearly up to the umbel; leaves (1) 2, linear-lanceolate to narrowly lanceolate, 1–2 cm broad, scabrous-margined, greatly exceeding the umbel; spathe about half as long as the umbel, beakless; umbel hemispherical, densely many-flowered; pedicels subequal, (2)–3–5 times the length of perianth, ebracteolate; segments of the stellate perianth rosy-violet, with a dark or greenish nerve, 5–6 mm long, lanceolate, the outer acutish, the inner obtuse, at length recurved and twisted; filaments slightly exceeding to

about twice as long as perianth segments, connate, distinct above, linear-subulate, the inner slightly broader; ovary short-stipitate, scabrous. May.

Gravelly slopes. — Centr. Asia: Mtn. Turkm. (Sulyuklyu). Endemic. Described from Sulyuklyu. Type in Tashkent.

195. **A. karataviense** Rgl. in A.H.P. III (1875) 243. — Ic.: Rgl. Fl. turk. (1876) t. XVI, f. 1–3. — Exs.: Herb. Fl. As. Med. No. 59.

Perennial; bulb globose, 2–6 cm thick; tunics blackish or grayish, papery; scape stumpy, 10–25 cm long, sometimes buried in the soil up to the middle, shorter than the leaves; leaves commonly 2, rarely 1 or 3, lanceolate or often oblong or subelliptic, 3–15 cm broad, smooth-margined; spathe two-thirds as long to slightly shorter than the umbel, short-acuminate; umbel spherical, densely many-flowered; pedicels equal, 3–4 times the length of perianth, ebracteolate; segments of the stellate perianth light rosy-violet, with a darker nerve, 5–7 mm long, linear, obtuse, at length recurved and twisted; filaments slightly exceeding the perianth segments; at base connate and adnate to perianth, united higher up, subulate from triangular base, the base of inner filaments half as broad again; ovary stipitate, scabrous; capsule obcordiform, ca. 8 mm in diameter. April-May.

Loose calcareous screes in the lower mountain zone. — Centr. Asia: Pam.-Al. (Alai Range), T. Sh. (W. Tien Shan). Endemic. Described from Kara-tau mountains: Bugun. Type in Leningrad.

196. **A. Mariae** E. Bordz. in Zap. Kiev. O-va Est. XXV, I (1915) 71.

Perennial; bulb ovoid, $1\frac{1}{2}$–2 cm long; scape terete, smooth, 15–35 cm long, covered at base or up to 1/3 with leaf sheaths; leaves 2 or 3, narrowly linear, 2.5–8 mm broad, canaliculate, glaucous, scabrous at margin and often on the veins, about as long as the scape; spathe acuminate, as long as or slightly exceeding the umbel; umbel fasciculate or subhemispherical; pedicels 2–5 times the length of perianth, ebracteolate; perianth segments vineous-red, with a brownish nerve, 3–4 mm long, linear-oblong, obtusish
263 to acutish, at length recurved; filaments slightly exceeding the perianth segments, at base connate and adnate to perianth, gradually attenuate from base; anthers blackish-vineous; ovary sessile, smooth; style slightly longer than stamens; capsule globose-ovoid to ovoid. May.

Dry slopes. — Caucasus: S. Transc. Endemic. Described from Nakhichevan, Chinabad. Type in Kiev.

197. **A. cardiostemon** Fisch, et Mey. in Ind. Sem. Horti Petrop. VI (1840) 43; Ldb. Fl. Ross. IV 188; Boiss. Fl. Or. V (1884) 282.

Perennial; bulb ovoid, 0.5–1–2 cm thick; tunics blackish, papery; scape 20–40–(60) cm long, smooth, covered at base with leaf sheaths; leaves 2 or 3, linear-lanceolate to linear, 2–8 mm broad, more or less scabrous-margined, shorter than the stem, usually very much so; spathe short-acuminate, two-thirds as long to slightly shorter than the umbel; umbel fasciculate-hemispherical or subspherical, densely many-flowered; pedicels equal, 3–4 times the length of perianth, ebracteolate; segments of the stellate perianth dark red, ca. 3 mm long, linear, obtuse, at length recurved and twisted; filaments barely shorter than perianth segments, at base connate and adnate to perianth, the outer subulate, the inner much

broader, 2-toothed above the middle; ovary sessile, smooth; capsule ovoid to subglobose, 3–4 mm long. June-July.

Dry slopes. — Caucasus: E. and S. Transc. **Gen. distr.**: Iran. Described frpm Nakhichevan: Koshadar. Type in Leningrad.

198. **A. Fetissovii** Rgl. in A.H.P. V (1878) 631. — A. simile Rgl. in A.H.P. (1887) 359. — A. tschimganicum B. Fedtsch., Rast. Turk. (1915) 237 p. p. — Ic.: Rgl. Gartenfl. (1879) t. 971, t. a–f.

Perennial; bulb globose, 1–1.5 cm thick; tunics black, papery; scape 40–65 cm long, ribbed by prominent nerves; leaves 1 or 2, lorate, 2–15 mm broad, smooth- or obscurely scabrous-margined, much shorter than the scape; spathe half as long as the umbel, short-acuminate; umbel spherical or hemispherical, densely many-flowered; pedicels subequal, 2–3 times the length of perianth, ebracteolate; segments of the stellate perianth delicate, obscurely nerved, 5–7 mm long, linear, obtuse to subobtuse, at length recurved and twisted; filaments three-quarters as long as perianth segments, at base connate and adnate to perianth, distinct above, the outer subulate from base, the inner subulate from a nearly square 2- to 4-toothed or rarely triangular toothless base; ovary short-stipitate, scabrous; capsule ovoid to globose, ca. 4 mm in diameter.

264 Loose-textured soils. — Centr. Asia: Pam.-Al. (Alai Range), T. Sh. Endemic. Described from Alma Ata.

Note. The author was in a position to compare live specimens of A. Fetissovii from Ugam (A. simile) and from Alma Ata. (A. Fetissovii s.s.). The Alma Ata plant is distinguished by smaller flowers, much narrower than the perianth segments of a somewhat different hue (they are rose and distinctly purple at base as against the rosy-violet perianth of the Ugam plants), the globose ovary and darker filaments. The Ugam specimens are altogether coarser and larger in all parts. I did not, however, have enough material to ascertain the consistency of these characters.

199. **A. dasyphyllum** Vved. in Herb. Fl. As. Med. (1925) No. 57.

Perennial; bulb ovoid to globose-ovoid, 0.75–1.5 cm thick; tunics blackish, papery; scape 15–25–(35) cm long, ribbed by prominent nerves, scabrous due to short hairs; leaf solitary, linear, 2–3–(5) mm broad, scabrous due to short hairs, much shorter than the scape; spathe two-thirds as long as to slightly shorter than the umbel, short-acuminate, umbel fasciculate-hemispherical or hemispherical, relatively many-flowered, dense; pedicels equal, half as long again to twice as long as perianth, ebracteolate; segments of the stellate perianth white, with a prominent green nerve, 4 mm long, linear-lanceolate, acute, at length recurved and twisted; filaments barely exceeding the perianth segments, at base connate, united above into a ring, the outer subulate, the inner about 3 times as broad at base, subulate from an almost square and almost toothed base; ovary short-stipitate; scabrous; capsule subglobose, 4–5 mm long. July.

Stony slopes in the upper mountain zone. — Centr. Asia: T. Sh. (known only from the classical location: Aleksandrovskii Range: Uch-bulak). Type in Tashkent.

200. **A. insufficiens** Vved. in Bull. Univer. As. Centr. 19 (1934) 129.

Perennial; bulb subglobose, 0.75–1.25 cm thick; tunics blackish, papery; scape slender, smooth, 20–30 cm long; leaves 3–6, narrowly linear, 1–2 mm broad, ciliate-scabrous at margin, much shorter than the scape (apparently half as long); spathe short-acuminate, slightly shorter than the umbel; umbel fasciculate-spherical or hemispherical, relatively many-flowered, dense; pedicels equal, 2–3 times the length of perianth, ebracteolate; segments of the stellate perianth apparently rosy-violet, with a darker nerve, 4–5 mm long, linear, obtuse, at length recurved and twisted; filaments about as long as perianth segments, at base adnate to
265 perianth, distinct above, abruptly subulate from broadly triangular base, subequal; ovary sessile, smooth; capsule subglobose, ca. 3.5 mm in diameter. April-May.

Mildly saline clay soils. — Centr. Asia: Pam.-Al. (Kurgan-tyube, Tashbulak, Sarsaryak). Endemic. Described from vicinity of Kurgan-tyube. Type in Leningrad.

201. A. **robustum** Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 853. — A. robustum var. alpestre Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 513.

Perennial; bulb subglobose, 1–2 cm thick; tunics blackish, papery; scape 40–60 cm long, inconspicuously nerved; leaves 2–4, linear, 2–10 mm broad, smooth-margined, much shorter than the scape; spathe short-acuminate, two-thirds as long as to slightly shorter than the umbel; umbel hemispherical or subspherical, densely many-flowered; pedicels equal, $1\frac{1}{2}$–2–(3) times the length of perianth, ebracteolate; segments of the stellate perianth dark purple, with a darker nerve, ca. 5 mm long, linear-lanceolate, obtuse, at length recurved and twisted; filaments as long as perianth segments, adnate at base to perianth, united above into a ring, subulate from triangular base, the base of inner filaments twice as broad; ovary subsessile, scabrous; capsule ovoid-globose, ca. 4 mm in diameter. May-June.

Dry slopes. — Centr. Asia: Dzu.-Tarb. Endemic. Described from Tarbagatai: Chegarak-asu. Type in Leningrad.

202. **A. decipiens** Fisch. ex Roem. et Schult. Syst. VII (1830) 1117; Boiss. Fl. Or. V (1884) 282; Shmal'g., Fl. II, 491; Kryl., Fl. Zap. Sib. III, 632. — A. tulipifolium Ldb. Ic. pl. fl. Ross. II (1830) 13, t. 137; Ldb. Fl. Ross. IV, 187. — A. viridulum Ldb. Fl. Alt. II (1830) 20 (pro max. parte, quoad specimina autentica). — A. Roborovskianum Rgl. in A.H.P. X (1887) 359, t. VIII, f. 4. — A. atropurpureum auct.

Perennial; bulb globose-ovoid to globose, 0.75–1.5–2 cm thick; tunics blackish, papery; scape 20–50–(70) cm long, smooth; leaves 2–4–(6), linear to linear-lanceolate, (2)–5–20–(3) mm broad, smooth- or scabrous-margined, much shorter than the scape; spathe short-acuminate, hemispherical or subspherical, loosely many-flowered; pedicels equal, 2–6 times the length of perianth, ebracteolate; segments of the stellate perianth, pale rosy-violet or violet (?), with a violet nerve, ca. 5 mm long, narrowly elliptic, obtuse, at length recurved and twisted; filaments as long as perianth segments, adnate at base to perianth, slightly united above, subulate from triangular base, the base of inner filaments twice

as broad; ovary subsessile, scabrous; capsule ovoid, ca. 5 mm in diameter. May-June.

266 Stony slopes, outcrops, solonetz soils, and sands. — European part: V.-Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc.; W. Siberia: U. Tob., Irt., Alt.; Centr. Asia: Ar.-Casp., Balkh. **Gen. distr.**: Dzu.-Kash. Described from the area between the Dnieper and the Crimea.

203. **A. Severtzovii** Rgl. in Bull. Soc. Nat. Mosc. XLI 1 (1867) 453. — A. tschimganicum B. Fedtsch., Rast. Turk. (1915) 237 (p. p.). — Exs.: Herb. Fl. As. Med. No. 342.

Perennial; bulb globose, 1–2 cm thick; tunics grayish, papery; scape 35–85 cm long, furrowed by prominent nerves; leaves (1)–2–3, linear to linear-lanceolate, 5–20 mm broad, scabrous-margined, much shorter than the scape; spathe half as long as the umbel, short-acuminate; umbel hemispherical or rarely spherical, rather densely many-flowered; pedicels subequal, half as long again as the perianth, ebracteolate segments of the stellate perianth rose, with a violet nerve, ca. 4 mm long, linear, obtusish, at length recurved and twisted; filaments slightly shorter than to equaling the perianth, adnate to perianth at base, distinct above, subulate from triangular base, the base of inner filaments 2–3 times as broad; ovary short-stipitate; scabrous; capsule subglobose to ovoid, ca. 4 mm in diameter. June.

Gravelly slopes. — Centr. Asia: T. Sh. (W. Tien Shan). Endemic. Described from Kara-tau mountains. Type in Leningrad.

204. A. **Suvorovi** Rgl. Gartenfl. (1881) 356, t. 1062, f. 4–5. — Ic.: Rgl. Fl. turk. (1876) t. XVII, f. 5–7. Exs.: Herb. Fl. As. Med. No. 181 (sub A. Severtzovii).

Perennial; bulb ovoid, 2–3 cm in diameter; tunics subcoriaceous, grayish, splitting, clasping the scape base; scape 30-100 cm long, inconspicuously nerved; leaves 2–6, lorate, 5–20 mm broad, scabrous-margined, glaucescent, much shorter than the scape; spathe short-acuminate, two-thirds as long as the umbel; umbel hemispherical or spherical, densely many-flowered; pedicels equal, 2–5 times the length of perianth, ebracteolate; segments of the stellate perianth rosy-violet, with a darker nerve, ca. 4 mm long, linear, obtuse, at length recurved and twisted; filaments slightly shorter and slightly longer than perianth segments adnate to perianth at base, distinct above, subulate from enlarged base, subequal; ovary subsessile, smooth; capsule broadly ovoid, ca. 5 mm in diameter. May.

Loosely textured soils in foothills, chiefly as weed in oases. — Centr. Asia: Mtn. Turkm. (Kushkinskii River), Syr D., Pam.-Al., T. Sh. **Gen. distr.**: Iran (?). Described from Dal'verzinskaya Steppe.

267 205. **A. grande** Lipsky in A. H. P. XIII (1894) 343. — A. decipiens var. latissimum Lipsky in Zap. Kiev. O-va Est. XII, 2 (1892) 363; Shmal'g., Fl. II, 491.

Perennial; bulb ovoid-globose, 2.5 cm broad; scape 70 cm long (and longer), inconspicuously nerved; leaves 2–4, lorate, 3–5 cm broad, smooth-margined, much shorter than the scape; spathe half as long as to slightly shorter than the umbel, short-acuminate, umbel subspherical,

densely many-flowered; pedicels equal, 3–4 times the length of perianth, ebracteolate; segments of the stellate perianth whitish-rose, obscurely nerved, lanceolate, acute, 6–7 mm long, recurved after anthesis; filaments barely shorter than perianth segments, adnate at base to perianth, distinct above, subulate from triangular base, the base of inner filaments half as broad again; ovary short-stipitate, smooth. May.

Damp places among shrubs. — Caucasus: Dag. Endemic. Described from Makhach-Kala. Type in Leningrad.

206. **A. alaicum** Vved. in Bull. Univer. As. Centr. 19 (1934) 130.

Perennial; bulb ovoid-globose, 1–1.5 cm thick; tunics blackish-gray, papery, slightly splitting; scape 30–70 cm long, ribbed by prominent nerves, glabrous or covered with long retrorse hairs; leaves 1 or 2, linear-lanceolate to linear, 5–17 mm broad, acute, one-third to one-half as long as the scape, covered on both sides with long retrorse hairs, sometimes subvillous, rarely glabrate; spathe short-acuminate, two-fifths to one-half as long as the umbel; umbel fasciculate-hemispherical, rarely spherical, rather loosely many-flowered; pedicels equal, 2–3 times the length of perianth, ebracteolate; segments of the stellate perianth apparently light violet, with a darker nerve, 6 mm long, linear, obtusish, at length recurved and twisted; filaments about as long as perianth segments, adnate at base to perianth, distinct, abruptly subulate from a short enlarged base, the base of inner filaments half as broad again; ovary short-stipitate; capsule ovoid-globose, ca. 4 mm in diameter. May-June. (Plate XV, Figure 1, a).

Gravelly soils. — Centr. Asia: Pam.-Al. (Gul'cha, Aravan, Lyangar). Endemic. Described from Gul'cha. Type in Leningrad.

207. **A. stipitatum** Rgl. in Gartenfl. (1881) 355, t. 1062, f. 1–3.

Perennial; bulb applanate-globose, 3–6 cm thick; tunics blackish, almost papery, enclosing a solitary large smooth bulblet; scape 60–150 cm long smooth; leaves 4–6, lorate, 2–4 cm broad, smooth-margined, hairy
268 beneath, rarely glabrate; pedicels subequal, 3–6 times the length of perianth, ebracteolate; segments of the stellate perianth lilac, distinctly nerved, 9 mm long, gradually attenuate from base, acute, at length recurved and twisted; filaments as long as perianth segments, adnate at base to perianth, united above into a ring, rather gradually subulate from triangular base, the base of inner filaments twice as broad; ovary short-stipitate, scabrous; capsule applanate-globose, ca. 5 mm in diameter. May-June.

Loosely-textured slopes in the middle mountain zone. — Centr. Asia: Pam.-Al. Endemic. Described from Zeravshan Valley. Type in Leningrad.

208. A. **gultschense** B. Fedtsch. in A. H. P. XXVIII (1908) 68.

Perennial; bulb ovoid-globose, 3–5 cm thick; tunics blackish, papery; scape robust, 90–150 cm long, smooth; leaves 5 or 6, lorate, 4–8 cm broad, smooth-margined, much shorter than the scape; spathe short-acuminate, two-thirds as long as the umbel; umbel spherical, densely many-flowered; pedicels unequal, the inner half as long again, 2–3 times the length of perianth, ebracteolate; segments of the stellate perianth white, with a green nerve, 11 mm long, filiform-linear, gradually attenuate from base, at length recurved and twisted; filaments slightly shorter than

perianth segments, adnate at base to perianth, not connate, the outer subulate, the inner half as broad again, subulate from a nearly square 2-toothed base; ovary sessile, scabrous; capsule globose, ca. 6 mm in diameter. May-June.

Dry slopes in the middle mountain zone. — Centr. Asia: Pam.-Al. (Alai Range), T. Sh. (Fergana Range). Endemic. Described from Alai Range, Gul'cha. Type in Leningrad.

209. **A. aflatunense** B. Fedtsch. in Bull. Herb. Boiss. IV (1904) 917, cum tabula.

Perennial; bulb ovoid, 2–6 cm thick; tunics grayish, papery; scape robust, 80–150 cm long, inconspicuously nerved, surrounded at base below and above ground level with leaf sheaths; leaves 6–8, lorate, the outer 2–10 cm broad, glaucous, smooth-margined, much shorter than the scape; spathe slightly shorter than the umbel, short-acuminate; umbel subspherical, densely many-flowered; pedicels subequal, 2–4 times the length of perianth, ebracteolate; segments of the stellate perianth light violet, with a darker nerve, 7–8 mm long, linear-lanceolate, acute, at length recurved and twisted; filaments slightly exceeding the perianth segments, adnate at base to perianth, distinct above, the outer subulate, the inner subulate from a nearly square base, the base of inner filaments half as broad again to
269 nearly twice as broad; anthers violet; ovary stipitate, scabrous; capsule broadly ovoid, scabrous, ca. 5 mm in diameter. May.

Upper and middle mountain zone. — Centr. Asia: T. Sh. (Central Tien Shan). Endemic. Described from Aflatun. Type in Leningrad.

210. **A. altissimum** Rgl. in A. H. P. VIII (1884) 666, t. XXI, f. k.—m. — A. esjdianum Vved. in Fl. Turkm. II (1932) 282.

Perennial; bulb globose, 3 cm thick; tunics grayish, papery; scape 80–150 cm long, inconspicuously nerved; leaves 4–6, linear-lanceolate, sublorate, 2–4 cm broad, more or less green, nearly smooth-margined, much shorter than the scape; spathe half as long as the umbel, short-acuminate; umbel spherical, densely many-flowered; pedicels unequal, the central up to half as long again, 4–6 times the length of perianth, ebracteolate; segments of the stellate perianth violet, with a darker nerve, 6–7 (8) mm long, linear-lanceolate, obtuse, at length recurved and twisted; filaments as long as or slightly shorter than perianth segments, adnate at base to perianth, more or less united above, subulate from triangular base, the base of inner filaments twice as broad; ovary short-stipitate, scabrous; capsule obovoid, ca. 5 mm in diameter. April.

Gullies. — Centr. Asia: Mtn. Turkm., Pam.-Al. Endemic. Described from Bal'dzhuan. Type in Leningrad.

Note. The author has not been able to find in herbaria any real differences between the Kopet Dagh and Pamir-Alai plants; but, on the other hand, all the material that he have examined differs from the authentic plant in having narrower and somewhat shorter perianth segments. A comparison of live plants from Fergana and Kopet Dagh is needed.

Our species differs from A. jesdianum Boiss. et Buhse in parallel-margined perianth segments and the inconspicuous ribs of the scape.

211. A. taeniopetalum M. Pop. et Vved. in Bull. Univer. As. Centr. 19 (1934) 130.

Perennial; bulb subglobose, 1–2 cm thick; scape 20–40 cm long, ribbed by prominent nerves; leaves 2 or 3, lorate, 1–2 cm broad, smooth-margined, much shorter than the scape; spathe half as long as the umbel, short-acuminate; umbel fasciculate-hemispherical or spherical, relatively many-flowered, loose; pedicels unequal, the central half as long again, 2–4 times the length of perianth, ebracteolate; segments of the stellate perianth dark rosy-violet, with a green nerve, 8–12 mm long, linear, with nearly parallel margins, obtuse, at length recurved and twisted; filaments two-thirds as long as perianth segments, adnate at base to perianth, united above into a ring, subulate from triangular base, the inner slightly broader;
270 anthers violet; ovary subsessile, scabrous; capsule ovoid to subglobose, ca. 5 mm in diameter. May.

In the shade of rocks. — Centr. Asia: Pam.-Al. Turkestan Range. Described from Zerabulakskie heights. Type in Leningrad.

Note. Closely related to A. Rosenbachianum Rgl., from which it is distinguishable by the parallel margins of perianth segments and shorter filaments.

212. A. Rosenbachianum Rgl. in A. H. P. VIII (1884) 664, t. XXI, f. c–i.

Perennial; bulb globose, 1.5–2.5 cm thick; tunics blackish, papery; scape 50–70 cm long, ribbed by prominent nerves; leaves 2 or 3, linear-lanceolate to broadly linear, (0.5)–1.5 cm broad, nearly smooth-margined, much shorter than the scape; spathe short-acuminate, one-half to two-thirds as long as the umbel; umbel spherical, loosely many-flowered; pedicels unequal, the central to half as long again, 3–9 times the length of perianth, ebracteolate; segments of the stellate perianth dark violet, with a darker nerve, narrowly linear, gradually attenuate from base, acute, 7–10 mm long, at length recurved and twisted; filaments as long as perianth segments, adnate at base to perianth, united above into a ring, subulate from triangular base, the inner half as broad again; anthers violet; ovary short-stipitate, scabrous; capsule applanate-globose, ca. 5 mm in diameter. May.

Loose-textured terraces in the middle mountain zone, in the shade of rocks and trees. — Centr. Asia: Pam.-Al. (SW). Endemic. Described from Bal'dzhuan, Kyzyl-su. Type in Leningrad.

213. A. Komarovi Lipsky in A. H. P. VIII (1900) 129. —

Perennial; bulb globose, 2–4 cm thick; scape 30–50 cm long, practically without prominent nerves; leaves 1 or 2, broadly lanceolate to oblong, 4–8 cm broad, smooth-margined, subacute, much shorter than the scape; spathe short-acuminate; two-thirds as long as the umbel; umbel hemispherical, densely many-flowered; pedicels equal, 2–3 times the length of perianth, ebracteolate; segments of the stellate perianth dark lilac with a darker nerve, linear-lanceolate, ca. 6 mm long, obtusish, at length recurved and twisted; filaments slightly shorter than perianth, adnate at base to perianth, united above into a ring, gradually subulate from
273 triangular base, the base of inner filaments twice as broad; ovary short-stipitate, scabrous; capsule subglobose, ca. 6 mm in diameter. May-June.

Taluses in upper mountain zone. — Centr. Asia: Pam.-Al. Endemic. Described from Iskander-kul'. Type in Leningrad.

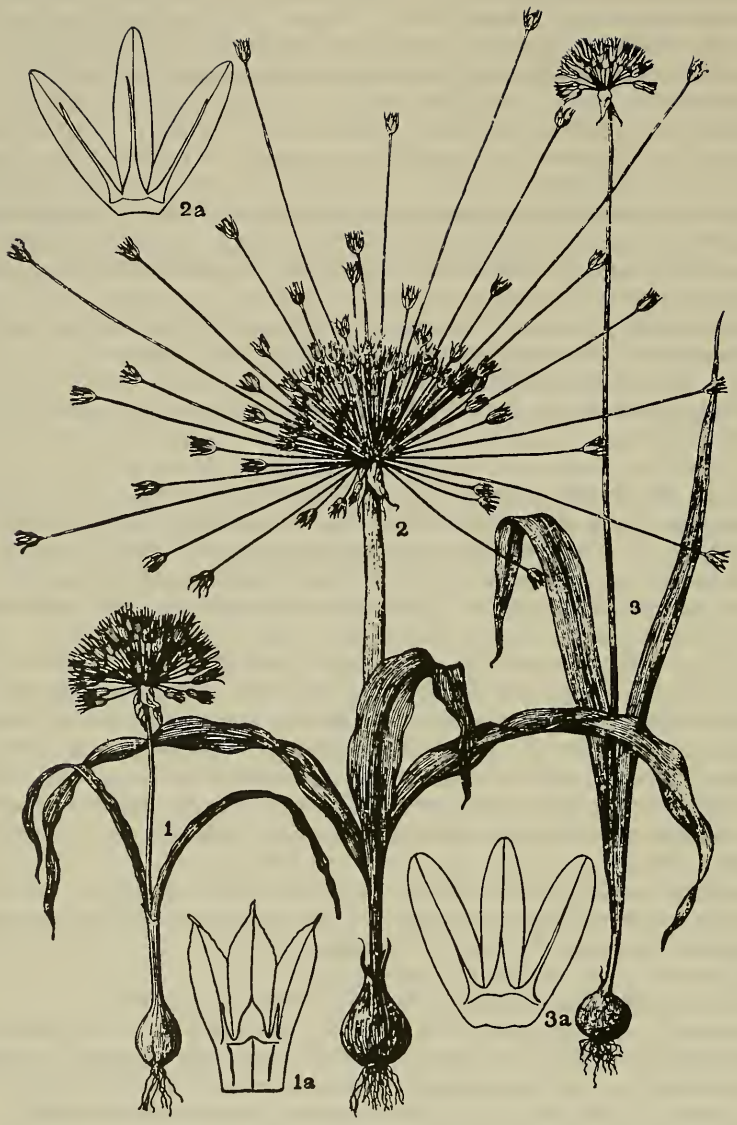

Plate XVI

1. Allium gypsaceum M. Pop. et Vved.; 1a) portion of perianth.— 2. A. Schubertii Zucc.; 2a) portion of perianth.— 3. A. Winklerianum Rgl.; 3a) portion of perianth.

214. **A. seravschanicum** Rgl. in A.H.P. III (1875) 244.— Ic.: Rgl. Fl. turk. (1876) t. XVII, f. 1–4.

Perennial; bulb globose, (1)–1.5–2 cm in diameter; tunics gray, papery, sometimes enclosing a solitary large bulblet; scape 25–50 cm long, ribbed by prominent nerves; leaves 1 or 2, linear-lanceolate, 1–4 cm broad, scabrous- or smooth-margined, shorter than the scape; spathe short-acuminate, one-third to one-half as long as the umbel; umbel spherical or subspherical, loosely many-flowered; pedicels unequal, the central slightly exceeding the perianth; ebracteolate; segments of the stellate perianth dark rosy-violet, with a darker nerve, 6–7 mm long, linear, gradually attenuate from base, acute, at length recurved and twisted; filaments slightly shorter than perianth, subulate, adnate at base to perianth, united above into a ring, this toothed between the filaments; ovary short-stipitate, smooth, with 6 crests; capsule subglobose, ca. 4 mm in diameter. May.

Shady places in the middle mountain zone.— Centr. Asia: Pam.-Al. Endemic. Described from Zeravshan. Type in Leningrad.

215. **A. pseudoseravschanicum** M. Pop. et Vved. in Sched. ad Herb. Fl. As. Med. (1935) No. 621.

Perennial; bulb globose, 1–2 cm thick; tunics blackish, papery; scape (20)–30–50–(70) cm long, ribbed by prominent nerves; leaves 1 or 2, linear-lanceolate, 1–4 mm broad, scabrous-margined, much shorter than the scape; spathe half as long as to slightly shorter than the umbel, short-acuminate; umbel spherical or subspherical, densely many-flowered; pedicels unequal, the central slightly longer, 2–3 times the length of perianth, ebracteolate; segments of the stellate perianth light rosy-violet, with a darker nerve, 6–8 mm long, linear, gradually attenuate from the middle, acute, at length recurved and twisted; filaments slightly shorter than perianth segments, subulate, adnate at base to perianth, united above into an entire-margined ring; ovary short-stipitate, smooth, with 6 crests; capsule subglobose, ca. 4 mm in diameter. May-June.

Shady places.— Centr. Asia: Mtn. Turkm. Endemic. Described from Syunt. Type in Leningrad.

274 Note. Closely related to A. seravschanicum Rgl., but distinguishable by the lighter-colored flowers and the more compact umbel. Deserves more study.

216. **A. elatum** Rgl. in A.H.P. VIII (1884) 665, t. XX, f. g. k.— A. isphairamicum B. Fedtsch. in A.H.P. XXVIII (1908) 67.

Perennial; bulb ovoid-globose, 2–6 cm thick; tunics blackish, papery; scape 60–100 cm long, ribbed by the rather prominent nerves; leaves 2–14, oblanceolate, 2–7 cm broad, smooth-margined; spathe two-thirds as long as the umbel; umbel spherical, densely many-flowered; pedicels equal, 3–8 times the length of perianth, ebracteolate; segments of the stellate perianth reddish-violet with a rather inconspicuous dark nerve, 6–8 mm long, linear-lanceolate, acutish to obtuse, not changing after anthesis; filaments slightly exceeding the perianth segments, at base connate and adnate to perianth, subulate from triangular base, the base of inner segments half as broad again; ovary sessile, scabrous. June-July.

Stony slopes in the upper mountain zone.— Centr. Asia: Pam.-Al. Endemic. Described from Bal'dzhuan.

217. **A. giganteum** Rgl. in Gartenfl. (1883) 97, t. 1113. — A. procerum Trautv. in A.H.P. IX (1884) 274.

Perennial; bulb ovoid, 4–6 cm thick; tunics rather numerous, grayish-brown, splitting; scape robust, 80–150 cm long, rather inconspicuously nerved; leaves lorate, glaucous, 5–10 cm broad, smooth, one-third to one-half as long as the scape; spathe half as long as the umbel, short-beaked; umbel spherical, densely many-flowered; pedicels subequal, 5 times the length of perianth, ebracteolate; segments of the stellate perianth, light violet, obscurely nerved, 5 mm long, elliptic, obtuse, not changing after anthesis; filaments about half as long again as perianth segments, at base connate and adnate to perianth, subulate from triangular base, the base of inner filaments half as broad again; ovary subsessile, scabrous; capsule subglobose, ca. 4 mm in diameter. April-May.

Loose-textured slopes in the lower mountain zone. — Centr. Asia: Mtn. Turkm., Pam.-Al. (S.). Gen. **distr.**: Iran. Described from vicinity of Merv (?). Type in Leningrad.

218. **A. Trautvetterianum** Rgl. in A.H.P. VIII (1884) 661, t. XXI, f. a–b.

Perennial; bulb ovoid-globose, 2–3 cm thick; tunics grayish, almost
275 papery; scape 50–60 cm long, ribbed by prominent nerves; leaves 2, lanceolate, 2–3 cm broad, smooth-margined, much shorter than the scape; spathe one-half to two-thirds as long as the umbel; umbel spherical, densely many-flowered; pedicels equal, 3–5 times the length of perianth, immersed at base in the thickened spongy top of the scape, ebracteolate; segments of the stellate perianth light violet (?), obscurely nerved, 7–10 mm long, elliptic, obtuse, subcoriaceous after anthesis; filaments slightly shorter than perianth segments, at base connate and adnate to perianth, subulate from triangular base, the base of inner filaments half as broad again; ovary short-stipitate, scabrous. May.

Mottled outcrops (?). — Centr. Asia: Pam.-Al. (Ak-su, Tut-kaul). Endemic. Described from Bal'dzhuan. Type in Leningrad.

219. **A. Schubertii** Zucc. in Abh. Münch. Acad. III (1843) 234, t. III, f. 1; Boiss. Fl. Or. V (1884) 278. — A. buncharicum Rgl. in A.H.P. VIII (1884) 660, t. XX, f. a–c. — Exs.: HFAM No. 64 .

Perennial; bulb globose, 2–3 cm thick; tunics blackish, papery; scape stumpy, 10–30 cm long; leaves linear-lanceolate, 6–30 mm broad, crisp, glaucous, scabrous-margined, slightly exceeding the scape; spathe much shorter than the umbel, the beak very short; umbel spherical, rarely hemispherical, very closely many-flowered; pedicels commonly very unequal, fruiting 1–10 cm long, sterile 2–20 cm long, clavately thickened at the end especially in fruit, ebracteolate; segments of the stellate perianth whitish or rosy, with a green or dingy purple nerve, 4–8 mm long, linear-lanceolate to lanceolate, obtuse or obtusish, rigid after anthesis, obliquely ascending; filaments of sterile flowers two-thirds as long as perianth segments, those of fertile flowers two-thirds as long as to equaling the perianth segments, in sterile flowers connate and adnate to perianth to 1/3–1/2, in fertile to 1/6, subulate from dilated subequal bases; ovary subsessile; capsule ca. 4 mm long. May-June. (Plate XVI, Figure 2, a).

Gravelly slopes in the lower mountain zone and sands. — Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Pam.-Al., T. Sh. Gen. **distr.**: E. Med. Described from Palestine.

220. A. caspium (Pall.) M. B. Fl. taur.-cauc. I (1808) 265; Ldb. Fl. Ross. IV, 186; Shmal'g., Fl. II, 491. — Crinum caspium Pall. Reise... II (1773) 736, t. Q. — Amaryllis caspia Willd. Sp. pl. II (1799) 62. — A. baissunense Lipsky in A. H. P. XVIII (1900) 140. — Ic.: Fl. Yugo-Vost. III (1929) Figure 183. — Exs.: HFAM No. 333.

Perennial; bulb globose, 2–4.5 mm in diameter; tunics papery, nearly
276 black; scape stumpy, 10–30 cm long; leaves 1–3, ranging from linear or linear-lanceolate to broadly lanceolate, 5–25 mm broad, not exceeding the scape, the cartilaginous margin scabrous or smooth; spathe one-third as long as the umbel; umbel fasciculate, often hemispherical or spherical, rather loosely many-flowered; pedicels 2–4 or more times the length of perianth segments, up to 15 cm long, ebracteolate; segments of the campanulate perianth dingy greenish-violet or rarely whitish, 5–11 mm oblong to oblong-oval, rarely lanceolate, obtuse, the inner sometimes crenate, up to half as broad again as the outer, not changing after anthesis; filaments violet or rarely white, half as broad again as perianth segments, toothless, at base connate and adnate to perianth, subequal, linear-subulate from enlarged base: ovary smooth, short-stipitate; capsule obovoid, ca. 4 mm in diameter.

Sandy deserts and sands in areas of mottled outcrops. — European part: L. V.; Caucasus: Cisc., Dag.; Centr. Asia: Ar.-Casp., Kyz. K., Kara K., Mtn. Turkm. (Kushkinskii River), Syr D., Amu D., Pam.-Al. (SW). Endemic. Described from deserts adjacent to the Caspian.

Note. It is very likely that A. baissunensis Lipsky could be separated as a white-flowered local race with very restricted distribution, but for this more observations under natural conditions are needed.

221. A. **darvasicum** Rgl. in A. H. P. VIII (1884) 659, tab. VII, f. a–e.

Perennial; bulb globose, 1–2 cm thick; tunics grayish, papery; scape (10)–20–30–(50) cm long, ribbed by prominent nerves; leaves 1 or 2, linear to narrowly linear, 4–20 mm broad, more or less scabrous-margined, slightly shorter to slightly longer than the scape; spathe acuminate, two-thirds as long to slightly shorter than the umbel; umbel fasciculate-hemispherical or hemispherical, relatively many-flowered, dense; pedicels equal, slightly shorter than to half as long again as perianth, ebracteolate; segments of the narrowly campanulate perianth white, with a green nerve, 8–11 mm long, linear-oblong, commonly acute, the outer half as broad again, withering after anthesis; filaments half as long as perianth segments, connate and adnate to perianth to 3/5–2/3, nearly distinct above, triangular, the inner 3 times as broad as and slightly longer than the outer; ovary-short-stipitate; capsule subglobose, ca. 5 mm in diameter. June-July.

Loose-textured slopes in the middle and upper mountain zones. — Centr. Asia: Pam.-Al. (SE). Endemic. Described from Darvaz: Kuh-i-frush. Type in Leningrad.

222. **A. Winklerianum** Rgl. in A. H. P. VIII (1884) 661; Rgl. in A. H. P. X (1887) 354.

277 Perennial; bulb globose, 0.75–2 cm thick; tunics blackish, commonly papery; scape 15–40–(100) cm long, ribbed by prominent nerves; leaves 1–2–(4), linear to narrowly linear, 5–25 mm broad, smooth or at margin

and on the veins beneath scabrous, shorter than the scape; spathe acuminate, half as long as to slightly shorter than the umbel; umbel fasciculate-hemispherical or hemispherical, densely many-flowered; pedicels commonly equal, slightly shorter than to half as long again (or twice as long) as perianth, ebracteolate; segments of the narrowly campanulate perianth rosy-violet, with a darker nerve, 7–10–(13) mm long, linear-oblong, commonly obtuse, the outer half as broad again, withering after anthesis; filaments half as long as perianth segments, connate and adnate to perianth to 1/2–2/3, nearly distinct above, triangular, twice as broad as and slightly longer than the outer; ovary short-stipitate; capsule subglobose, ca. 5 mm in diameter. May-July. (Plate XVI, Figure 3, a).

Loose-textured slopes in the middle and upper mountain zone. — Centr. Asia: Pam.-Al., T. Sh. (Fergana Range). Gen. distr.: Dzu.-Kash. Described from "West Turkestan". Type in Leningrad.

Note. A polymorphic species which, like A. darvasicum, needs more study. Particularly distinctive are samples collected by Lipskii at Sary-socho Pass. They have very unequal pedicels (up to 5 cm long) and filaments adnate to perianth to somewhat higher up.

223. A. cupuliferum Rgl. in A.H.P. III (1875) 234. — Ic.: Rl. Fgl. turk. (1876) t. XV, f. 4–5.

Perennial; bulb globose, 1.5–2 cm thick; tunics blackish, papery, enclosing (always?) a large yellowish lustrous slenderly nerved bulblet; scape 30–50 cm long, ribbed by prominent nerves; leaves 1–3, linear-lanceolate to lanceolate, 5–30 mm broad, scabrous or smooth-margined, much shorter than the scape (down to half its length); spathe short-acuminate, much shorter than the umbel; umbel fasciculate or hemispherical, very loosely few-flowered; pedicels unequal, 2–6 times the length of perianth, ebracteolate; segments of the narrowly campanulate perianth rosy-violet, with a darker nerve, 10–15 mm long, linear-oblong, obtuse, the outer half as broad again, withering after anthesis; filaments half as long as perianth segments, connate and adnate to perianth to 2/3 their length, united to 1/3 above, triangular, the inner half as broad again and twice as long as the outer; ovary stipitate; capsule subglobose, 7 mm in diameter. May.

Stony slopes. — Centr. Asia: Pam. Al. (Nura-tau, Dzhizmanskoe Ravine, Andak, Tamerlanovy Vorota), Turkestan Range (Kuduk-sai), T. Sh. (Kaplanbek). Endemic. Described from Dzhizmanskoe Ravine. Type in Leningrad.

278 224. A. Regelii Trautv. in A.H.P. IX (1884) 275. — A. cupuliferum var. Regelii O. Kntze in A.H.P. X (1887) 292. — A. Latei Aitch. et Bak. in Trans. Linn. Soc. III (1888) 117. — Exs.: HFAM No. 179.

Perennial; bulb subglobose, 1–2 cm in diameter; tunics papery to subcoriaceous, blackish, splitting; scape 30–70 cm long; leaves 2 or 3, linear-lanceolate, 0.5–1.5 cm broad, more or less scabrous-margined; spathe one-third to one-half as long as the umbel, short-acuminate; umbels (1) 2 or 3 (4), one above the other, fasciculate, rarely hemispherical, loosely few-flowered; pedicels 2–3 times the length of perianth, ebracteolate; segments of the narrowly campanulate perianth rose, delicate, withering after anthesis and becoming somewhat twisted, acutish, the outer about twice as broad; filaments half as long as perianth segments, connate

and adnate to perianth to 3/5 their length, united for half the length of the free part, the inner triangular, broader and much longer than the outer; ovary sessile; capsule broadly ovoid, 7–8 mm in diameter. May-June.

Sand deserts and gravelly slopes in the lower mountain zone. — Centr. Asia: Mtn. Turkm., Kara K. Gen. distr.: Iran. Described from Ashkhabad.

Note. Trautvetter doubted whether A. Regelii had been collected in Akhal-teke or in Karabakh. It is now certain that this species does not occur in the flora of the Caucasus.

225. **A. iliense** Rgl. in Bull. Soc. Nat. Mosc. XLI, 1 (1868) 452. — Ic.: Fl. turk. (1876) t. XV, f. 9–10.

Perennial; bulb globose, 1–2 cm in diameter; tunics blackish-brown, papery; scape 15–35 cm in diameter, fairly slender; leaves linear-lanceolate, more or less crisp-margined, 7–20 mm broad, about equaling the scape; spathe much shorter than the umbel, short-acuminate; umbel 6–30-flowered, fasciculate or rarely hemispherical, very loose; pedicels unequal, 2–10 cm long, ebracteolate; segments of the narrowly campanulate perianth violet-rose, with dingy green nerve, 10–15 mm long, acutish, linear-lanceolate to lanceolate, the outer slightly broader than to half as broad again as the inner, erect after anthesis; filaments two-fifths to one-half as long as perianth segments, connate and adnate to perianth to 3/5–2/3, united for half the length of the free part, the inner triangular broader and much longer than the outer; ovary short-stipitate; capsule subglobose, 6 mm in diameter. May.

Gravelly slopes in the lower mountain zone, sands, mottled outcrops. — Centr. Asia: Ar.-Casp. (SE part), Balkh., Mt. Turkm., Pam.-Al. (Alai Range), T. Sh. (Mogol-tau). Endemic. Described from the Ili River. Type in Leningrad.

279 Section 8. **CALLOSCORDUM** (Herbert) Baker in Journ. Bot. III (1874) 290. — Calloscordum Herbert in Bot. Reg. XXX (1844) 66. — Bulb solitary, without rhizome, globose; leaf sheaths buried in the soil; pedicels bracteolate; perianth segments 1-nerved; filaments entire, adnate to perianth for half their length.

226. **A. nerinifolium** Baker in Journ. Bot. III (1874) 290. — Calloscordum nerinifolium Herbert in Bot. Reg. XXX (1844) 67. — A. Thunbergii Rgl. in A. H. P. III (1875) 234. non Don. — Ic.: Bot. Reg. XXXIII (1847) t. 5.

Perennial; bulb globose, 1–2 cm thick; tunics blackish, papery; scape 10–25 cm long, slender, often flexuous, prominently nerved, sometimes 2 from one bulb; leaves 2–6, narrowly linear, ca. 1 mm broad, canaliculate, smooth, shorter than the umbel; spathe much shorter than the umbel, acuminate; umbel fasciculate or fasciculate-spherical, relatively few-flowered, very loose; pedicels unequal, many times the length of perianth (up to 10 cm long), subtended by bracteolate; segments of the campanulate perianth rosy-violet, with a prominent darker nerve, 6–8 mm long, linear-oblanceolate, acute, united to 1/3 their length; filaments half as long as the perianth segments, united to the middle, subulate; ovary sessile. July-August.

Dry slopes. — E. Siberia: Dau. (rare). Gen. distr.: Mong., Jap.-Ch. Described from Chusan.

Section 9. **NECTAROSCORDUM** (Lindl.) Gren. et Godr. Fl. Fran. III (1855–56) 212. — Nectaroscordum Lindl. in Bot. Reg. IX (1836) t. 1913. — Bulb solitary, without rhizome; leaves destitute of aerial sheath, except the long-sheathing uppermost leaf; spathe deciduous; pedicels discoidally enlarged below the flower; perianth segments 3–7-nerved.

227. **A. tripedale** Trautv. in Tr. SPB. Bot. Sada (A. H. P.) II (1873) 485; Boiss. Fl. Or. V (1884) 284.

Perennial; bulb globose, ca. 1.5 cm thick; scape 50–90 cm long, enveloped to 1/4–1/3 by the sheath of the uppermost leaf; leaves slender, delicate, 1–1.5 cm broad; spathe deciduous; umbel fasciculate, relatively many-flowered, rather dense; pedicels unequal, 2–4 times the length of perianth, with a slightly developed disk below the flower; segments of the campanulate perianth white, reddish on the back, 12–15 mm long, deciduous, acute, the inner ovate, abruptly clawed, much broader than the oblong outer segments; filaments about one-third as long as perianth segments; style included. June.

Rock crevices. — Caucasus: S. Transc. Endemic. Described from Isti-su in Daralagez. Type in Leningrad.

280 228. **A. Dioscoridis** Sibth. et Sm. Prodr. Fl. Graec. I (1806) 222. — Nectaroscordum siculum var. Dioscoridis Boiss. Fl. Or. V (1884) 286. — N. siculum Shmal'g., Fl. II (1897) 495.

Perennial; bulb subglobose, 1.5–2.5 cm thick; tunics blackish, subcoriaceous; scape 70–125 cm long, smooth, covered to 1/3–1/2 with the sheath of the nearly bladeless uppermost leaf; leaves 3 or 4, linear, 1–1.5 cm broad, carinate, glabrous, smooth, about half as long as the scape; spathe deciduous; umbel fasciculate, relatively few-flowered, rather loose; pedicels unequal, 2–4 times the length of perianth, enlarged into a disk below the flower, ebracteolate; segments of the broadly campanulate perianth white suffused with greenish-red, red-nerved, 12–15 mm long, acute, the inner broadly ovate, abruptly-clawed, much broader than the oblong outer segments; filaments half as long as perianth, subulate; style included. May.

Shady woods. — European part: Gen. distr.: Bal.-As. Min. Described from Asia Minor.

Subfamily L. **Lilioideae** ENGL.

Bulbose plants; flowers in a terminal raceme (sometimes solitary); perianth with distinct or united segments; anthers commonly introrse; capsule loculicidal.

1. Flowers relatively large; perianth segments distinct; capsule cells many-seeded; flowers solitary or in a terminal raceme; cauline leaves 1 to many, sometimes in whorls, but mostly spirally arranged (Group Tulipeae) ..... 2.

+ Flowers relatively small; perianth segments mostly united, rarely distinct; capsule cells 2- or rarely many-seeded; flowers in racemes or solitary, always borne on leafless scapes . . . . . 8.

2. Anthers attached to filaments near the middle; perianth funnelform, in many species the segments strongly recurved . . . . 268. Lilium L.

+ Anthers basifixed . . . . . 3.

3. Flowers campanulate with erect segments or rarely infundibular-campanulate . . . . . 4.

+ Perianth segments strongly recurved or infundibular to stellate . . . . 7.

4. Flower erect; perianth segments destitute of nectaries, often with a dark blotch at base . . . . . 272. Tulipa L.

+ Flowers more or less nodding . . . . . 5.

5. Bulb of a single scale; nectaries prolonged into a furrow . . . . . 269. Korolkowia Rgl.

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+ Bulb of 2 or several scales; nectaries pit-shaped or spur-shaped. . . 6.

6. Nectary spur-shaped . . . . . 270. Rhinopetalum Fisch.

+ Nectary oval or triangular . . . . . 271. Fritillaria L.

7. Perianth segments narrow, united at base into a short tube, recurved from the middle or from base; stem bearing 2 petiolate ovate or broadly lanceolate leaves . . . . . 273. Erythronium L.

+ Perianth segments erect, lanceolate; small plants with grasslike leaves . . . . . 274. Lloydia Salisb.

8. Perianth segments distinct or united merely at base . . . . . 9.

+ Perianth segments united . . . . . 10.

9. Filaments filiform or dilated at base; perianth segments 1-nerved. . . . . 275. Scilla L.

+ Filaments flat; perianth segments many-nerved (may be obscurely nerved) . . . . . 276. Ornithogalum L.

10. Divisions of perianth longer than the campanulate tube; stamens petaloid . . . . . 277. Puschkinia Adams.

+ Divisions of perianth shorter than the tube . . . . . 11.

11 Perianth funnelform, the segments distinctly toothed . . . . . 12.

+ Perianth urceolate, with entire or slightly dissected margin . . . . . 14.

12. Perianth tubular-campanulate; inflorescence terminating in an erect cluster of sterile flowers; leaf margin often cartilaginous ciliate. . . . . 278. Bellevallia Lapeyr.

+ Perianth funnelform or campanulate-funnelform; inflorescence terminating in a single fertile flower; leaf margin soft . . . . . 13.

13. Divisions of perianth about as long as the tube; stamens unseriate. . . . . 279. Hyacinthus Tourn.

+ Divisions of perianth one-third the length of tube; stamens biseriate. . . . . 280. Hyacintella Schur.

14. Sterile flowers conspicuously different from the fertile; perianth zygomorphic, the outer segments with hornlike projections . . . . . 281. Leopoldia Parlat.

282 + Flowers uniform, horn-shaped, without projections . . . . . 15.

15. Perianth enlarged toward base, with 6 stellately arranged projections in upper part, constricted below the projections and segments into a very narrow throat . . . . . 282. Muscarimia Kostel.

+ Perianth broadest in middle part, constricted at throat, with 6 reflexed segments . . . . . 283. Muscari Tourn.

Genus 268. **LILIUM*** L.**

Gen. pl. (1731) 410; Sp. pl. (1753) 302.

Perianth deciduous, funnelform to subcampanulate, in section Martagon very open with reflexed segments; perianth segments rather long-clawed, the claws bearing rather long chink-shaped often fringed nectaries; stamens 6, shorter than perianth; filaments filiform, often slightly flattened; anthers linear, dorsifixed, versatile; ovary sessile, narrow, 3-loculed; style elongate, with a thick capitate 3-lobed stigma; capsule oblong, membranous or coriaceous, loculicidal; seeds numerous, flat, broadly oboval, with often margin testa; bulb often rhizomatous; stems erect, leafy, simple or rarely branched near apex. Genus type L. candidum L.

Subgenus I. **EULIRION** Rchb. Consp. Veget. (1828) 65. — Bulb perennial, scaly; leaves sessile or short-petioled, relatively narrow, broadest about the middle, with parallel or rarely reticulate venation; perianth segments, not saccate at base; style not elongating anthesis.

1. Flowers erect, funnelform or saucer-shaped; perianth segments broadest above the middle, slightly reflexed at tips (Section Pseudolirium) . . . . . 2.
+ Flowers nodding or pendulous; perianth segments often strongly recurved. . . . . 4.
2. Raceme many-flowered; flowers white, short-infundibular, fragrant. . . . . 1. L. candidum L.
+ Raceme 1–5-flowered; flowers orange or red, scarcely fragrant . . . . 3.
3. Stems relatively robust, ribbed, at base of flowers white-floccose; flowers large. . . . . 2. L. dahuricum Ker-Gawl.
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+ Stems slender, smooth; flowers smaller . . . . . 3. L. pulchellum Fisch.
4. Leaves on the middle part of the stem distinctly verticillate . . . . . 5.
+ Leaves alternate . . . . . 7.
5. Flowers lilac or cherry-rose . . . . . 4. L. martagon L.
+ Flowers yellow or red. . . . . 6.
6. Flowers light red, forming a subcorymbose or umbellate terminal inflorescence . . . . . 5. L. avenaceum Fisch.
+ Flowers yellowish-red or yellow, spotted, forming a raceme . . . . . 6. L. distichum Nakai.
7. Flowers lilac or red . . . . . 8.
+ Flowers yellow or yellowish-white . . . . . 11.
8. Rhizome creeping, with several bulbs; leaves to 1 cm broad; flowers conspicuously spotted, large, up to 12 cm in diameter . . . . . 7. L. Maximoviczii Rgl.
+ Bulb solitary, without lateral offshoots; leaves sublinear, crowded about the middle of the stem; flowers 4–6 cm in diameter. . . . . 7.
9. Bracts paired, callous-tipped; leaves broadly linear; flowers light red. . . . . 8. L. callosum Sieb. et Zucc.
+ Bracts solitary, acuminate, or absent; leaves crowded about the middle of the stem, narrowly linear . . . . . 10.

* From the Latin name of the genus.

** Arranged by V.L. Komarov.

10. Leaves obscurely denticulate-margined, papillose beneath; flowers bright red, inodorous, not speckled or with very few speckles. . . . . 9. L. tenuifolium Fisch.
+ Leaves pale lilac, aromatic, dark violet-speckled; entire. . . . . 10. L. cernuum Kom.
11. Flowers nearly white, with dark red speckles; anthers pale yellow; leaves glabrous, narrowly linear, 3-nerved . . . . . 11. L. Ledebourii Boiss.
+ Flowers pale or bright yellow; leaves mostly pubescent beneath. . . . 12.
12. Perianth segment 3.5–4 cm long, 6–7 mm broad, ciliate-margined, bright yellow, with numerous black dots; filaments papillose; anthers red; stem rather slender, glabrous. . . . . 12. L. ponticum C. Koch.
+ Flowers larger. . . . . 13.
13. Flowers stramineous; perianth segments ca. 8.5 cm long; anthers reddish-brown; leaves lanceolate . . . . 13. L. Kesselringianum Miscz.
+ Flowers bright yellow; perianth segments broader. . . . . 14.
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14. Perianth segments not narrowed toward base; stamens united into a tube or distinct below the middle, flat in lower part; anthers yellow. . . . . 14. L. monadelphum M. B.
+ Perianth segments narrowed toward base; stamens distinct; filaments terete to triquetrous; anthers red . . . . . 15. L. Szovitsianum Fisch. et Lall.

Section 1. **LEUCOFILIRION** Wilson, Lil. East. As. (1925) 17. — White lilies. — Flower tubular or saucer-shaped; flowers horizontal or nodding, rarely ascending; perianth segments falcately upturned; stamens not divergent.

1. **L. candidum** L. Sp. pl. (1753) 302; Ldb. Fl. Ross. IV, 172. — Ic.: Elwes. Monogr. Lil. tab.; Rchb. Ic. Fl. Germ. tab. 445.

Perennial, smooth throughout; bulb large, ovaloid, yellowish; basal leaves 6–8, wintering, oblanceolate; stem erect, stout, 0.6–1.2 cm long, with evenly distributed leaves; leaves alternate, the lower approximate drooping oblanceolate hairy-margined subobtuse, the upper appressed lanceolate acute progressively narrower; raceme short, pyramidal, bracteate; pedicels erect, nutant at the ends, often bracteolate; perianth pure white, broadly funnelform; segments oblanceolate, narrowed into petiole, falcate in upper third, obtuse; anthers and pollen pale yellow; style as long as perianth; capsule obovoid. June-July.

Caucasus: E. Transc., Tal.: cultivated in the USSR and, since ancient times, throughout the Mediterranean region. Described from cultivated specimens, with indication of origin from Palestine and Syria. According to Boissier (Fl. Or. V, 173), growing wild in the mountains of Lebanon. Type in London.

Economic importance. Ornamental and aromatic, used medicinally against burns, and nectariferous.

Plate XVII

1. Lilium dahuricum Ker.-Gawl.: 1a) bulb; 1b) bulb scale with reproduction bud.– 2. L. acenaceum Fisch.: 2a) leaf whorl; 2b) flower.– 3. L. monadelphum M.B., stamens.– 4. L. pulchellum Fisch.– 5. L. tenuifolium Fisch.: 5a) bulb.– 6. L. Ledebouri Boiss.– 7. L. callosum Sieb. et Zucc.; 7a) bulb.

Section 2. **PSEUDOLIRIUM** Wilson, Lil. East. As. (1925) 50. — False lilies. — Flower erect, vase-shaped or stellate; inner perianth segments broadest above the middle, clawed, slightly twisted at tips; stamens divergent.

2. **L. dahuricum** Ker.-Gawl. in Bot. Mag. XXX (1809), tab. 1210. — L. spectabile Link, Enum. II, Berol. I (1821) 321; Ldb. Fl. Ross. IV, 151; Turcz. Fl. baic.-dah. II, 213. — L. pseudodahuricum M. et S.
287 Fedossejev in Delectus H. B. Jur. (1899) 45. — L. bulbiferum et bulbosum Pall. Reise III, 231, 320, 253, 255. — Ic.: Elwes, Mon. Lil. tab. 21; Rgl. Gartenflora tab. 349. —

Perennial; bulb white, rounded, 2.5–4 cm long; bulb scales imbricated, lanceolate, acute, jointed about the middle; stem 30–120 cm long, erect, sparsely floccose, often glabrescent in age, or 5–20 cm long (var. alpinum Kusen.); leaves sessile, smooth or white-floccose, narrowly oblong-lanceolate, 3–5-nerved, 10–25 mm broad or 3–10 mm broad (var. angustifolium Litw.), ascending, rather appressed to stem; flowers erect, open, solitary (var. alpinum Kus. et al.) or 2–6, forming a kind of umbel (L. umbellatum Hort.) or a short raceme, the outer side of buds and pedicels often profusely pubescent or occasionally glabrous; perianth segments oboval-spatulate to oblanceolate, orange-red to sanguine, with yellow claws, 3–6 or up to 8 cm long, more or less spotted; nectaries smooth or often densely fringed throughout (var. costatum Rgl.); filaments glabrous; pollen red; capsule erect, oblong-obovaloid, 4–5 cm long, 2 cm across, obtusely angled, flat-topped. June-July. (Plate XVII, Figure 1, a, b).

Wet lowland meadows, forest glades, coppices, grassy slopes, etc. — E. Siberia: Yen., Ang.-Say., Lena-Kol., Dau.; Far East: Ze.-Bu., Uss., Sakh., Okh., Kamch. Gen. distr.: N. Mong., Manch., Korea. Described from Dauria. Type in London.

Economic importance: Ornamental; bulb and flowers edible.

3. **L. pulchellum** Fisch. in Fisch., Mey et Avé Lall. Ind. Sem. H. Petrop. VI (1889) 56; Ldb. Ross. IV, 152; Turcz. Fl. baic.-dah. II, 213. — L. concolor var. pulchellum Rgl. in Gartenfl. XXV (1876) 354. — Ic.: Elwes, Monogr. Lil. tab. 18, f. 1; Kom. and Alis., Opred. rast. Dal'nevost. Kr. I, Plate 115 (sub L. concolor Salisb.). — Exs.: HFR No. 1938, 2381.

Perennial; bulb white, ovaloid, ca. 2 cm long; bulb scales few, tightly closed, oval to oval-lanceolate; stems slender, erect, smooth, green, 25–60 cm long; leaves sessile, linear, 2–7 cm long, 3–6 mm broad, acute, appressed to stem; flowers erect, stellate, light red or rarely yellow (f. okihime Wilson), solitary or rarely several; perianth segments slightly pubescent outside or glabrous, lanceolate, 2.5–4 cm long and 5–10 mm broad, obtuse and callous-tipped; nectaries smooth; stamens shorter than perianth, with smooth filaments; anthers the color of perianth, 6–7 mm long; capsule oblong-ovaloid, 1.5–2 cm long, obtusely angled, flat-topped. June-July. (Plate XVII, Figure 4).

288 Riverside meadows, meadow sloples, and scrub. — E. Siberia: Dau.; Far East: Ze.-Bu., Uss., Gen. distr.: Manchuria and N. Korea. Described from Dauria.

Economic importance: Ornamental. Bulbs edible.

Section MARTAGON Wilson, Lil. East. As. (1925) 61. — Crisp or martagon lilies. — Flowers nodding; perianth segments recurved, broadest about the middle; stamens divergent.

4. **L. martagon** L. Sp. pl. (1753) 303; Ldb. Fl. Ross. IV, 149; Shmal'g., Fl. II, 509; Turcz. Fl. baic.-dah. II, 212. — L. pilosiusculum (Freyn) Miscz. in Trav. Musée bot. Acad. Petrop. VIII (1910) 192. — Ic.: Rchb. Ic. Fl. Germ. X, tab. 451, f. 989; Hegi Ill. Fl. Mitt. Eur. II, 61. — Exs.: HFR No. 2378, 2379.

Vernacular names: Russian: tsarskie kudri (Tsar's curls), liliya turetskaya (Turkish lily); Georgian: uronali; Armenian: lerna-shushan; Tatarian: sarishen; Siberian: saranka.

Perennial; bulb golden-yellow, ovoid, to 5 cm long; stem erect, 30–60 cm long, terete, glabrous, or scabrous by short hairs (var. pubescens Beck. and var. pilosiusculum Freyn), green or red-spotted; leaves in a whorl of 5 or 6 or more at the middle of stem, elliptic-lanceolate, alternate and shorter above; inflorescence a raceme; flowers 5–10 or solitary, nodding; perianth segments oblong, 3–3.5 cm long, recurved upward, light purple (vineous red), dark-spotted, sparsely covered with arachnoid hairs (var. pilosiusculum Freyn) or glabrous; stamens with purplish-violet stigmas; style twice the length of ovary; capsule 6-angled, sharply ribbed, obovoid, 2.5–3 cm long. June-July.

Forest glades, thinned coniferous and mixed forests, birch woods, stony mounds, slopes, and subalpine meadows. — European part: U.V., M.V., U. and M. Dnp., L. Don, Bl., Urals; Caucasus: W. Transc.*; W. Siberia: Ob (to 59° N. lat.), Irt., Alt.; E. Siberia: Ang.-Say., Lena-Kol., Dau. **Gen. distr.**: Centr. Eur., Italy, Balkans, N. Mong. Described from Hungary, Switzerland, Siberia, and Leipzig. Type in London.

Economic importance. Bulbs edible in fresh condition and dried; used in fodder, in medicine (vesicant, diuretic, wound healing); nectariferous; bulbs yield a black dye; ornamental.

5. **L. avenaceum** Fisch. in Gartenfl. XIV (1865) 290. — L. medeoloides A. Gray in Mem. Am. Acad. VI (1859) 415; Wilson Lil. of East. Asia 90. — L. maculatum Baker in Journ. Hort. Soc. Lond. IV (1877) 45. — Ic.: Elwes, Monog. Lilium tab. 35; Maxim. in Gartenfl. l.c., tab. 485.

Vernacular names: Russian: sarana ovsyanka; Japanese: kuruma-iuri.

289 Perennial; bulb white, rounded, 1.5–2.5 cm long and 2–2.5 cm in diameter; bulb scales numerous, oblong-lanceolate, fleshy; stems to 1 m long, smooth, leafless below, with 1 or rarely 2 leaf whorls above and then several alternate leaves; verticillate leaves up to 15 in the whorl, oblong-linear to broadly lanceolate, up to 17 cm long; raceme 1–10-flowered; pedicels nutant; bracts linear to linear-lanceolate; perianth segments initially erect, at length reflexed, orange or light red, with almost black spots, lanceolate, 3–4.5 cm long; nectaries obscurely fringed or not fringed; stamens shorter than perianth, smooth; anthers ca. 1 cm long, the color of perianth; capsule obconical, 1.5–2 cm long, 1.5 cm in diameter, flat-topped, angled. July-August. (Plate XVII, Figure 2, a, b).

* The single specimen which we have from Mount Apianga near Sukhumi (Yu.N. Voronov), with very broad oboval and slightly cuspidate leaves, may be the type of a distinct species, but it is insufficient for description.

Solitary or in groups in forest glades and in the shade of woods, among shrub thickets, and in high mountain meadows. — Far East: Ze.-Bu., Uss., Uda, Sakh., Okh., Kamch. **Gen. distr.**: Jap.-Ch. Described from Kamchatka. Type in Leningrad.

Note. Bulb edible (cooked); bulb scales characteristically constricted at 3/4 their length, the upper ovaloid point part resembling a cereal grain, hence the Russian name "ovsyanka" [oves, oats].

6. L. **distichum** Nakai apud Kamibayashi, Chosen Yuri Dzukai (1915) t. 7 et in Tokyo Bot. Mag. XXXI (1917) 6; Wilson Lil. of East. Asia 89. — L. medeoloides Palibin in A.H.P. XIX (1901) 113, non Gray. — L. Hansonii Kom. ib. XX (1901) 457, non Leichtlin. — Ic.: Kom. et Alis., Opred. rast. Dal'nevost. kr. I, Plate 113.

Perennial; bulb white, broadly ovaloid, 2–3 cm long and 2.5–3 cm in diameter, not compact; bulb scales cuspidate, usually jointed; stem to 1 m long, slightly ribbed, obscurely bristly below the leaf whorl, leafless or with 1 or 2 minute leaves above; verticillate leaves 5–20, oblong-lanceolate to oboval-lanceolate, 5–15 cm long, 1–4 cm broad, slightly cartilaginous-margined; flowers inodorous, pale orange, with dark spots, nodding, solitary or in a raceme of up to 6 or even 8 flowers; perianth segments recurved, divergent, lanceolate, 3–5 cm long; nectaries not fringed; stamens smooth; anthers ca. 1 cm long, the color of perianth; capsule broad, ca. 2 cm long, with winged ribs and flat top. July-August.

Broad-leaved forests. — Far East: Uss. (only S.). **Gen. distr.**: Korea, Manchuria. Described from Korea. Type in Tokyo.

* L. **Hansonii** Leichtlin apud Baker in Journ. Linn. Soc. XIV (1874) 245; Wilson Lil. East. Asia 91. — Ic.: Elwes Monogr. Lil. tab. 34.

290 Differing from the preceding species in the large bulbs, 4–6 cm long; stems with numerous whorls of leaves 10–18 cm long; flowers orange-yellow, fragrant; capsule conspicuously 6-winged.

Reported by Maximovich for the coast of Vladivostok Bay. This cultivated species actually originates from Island of Dazhelet or Ooringto in Sea of Japan. Records of this species for Manchuria, Korea and Ussuri refer in fact to L. distichum Nakai.

7. L. **Maximoviczii** Rgl. Suppl. Ind. Sem. Hort. Petrop. (1868) 26. — L. Leichtlinii var. Maximoviczii Baker in Gard. Chron. (1871) 1422. — L. tigrinum Kom. in A.H.P. XX (1901) 453, ex parte (non Gawl.). — Ic.: Elwes Monogr. Lil., tab. 40, f. 1; Rgl. Gartenfl. XVII, 322, tab. 596.

Perennial; bulbs solitary or with ropy underground rhizome bearing 1–5 small distinct bulbs 2–4 cm in diameter; bulbs globose; bulb scales few, thick, strongly convex, round or [?] jointless; young bulbs with only 2 outer scales; stems erect, robust, 1–1.3 cm long, smooth; leaves alternate, oblong-lanceolate, short-petioled, acute, 7–14 cm long, 9–16 mm broad, the upper ones shorter and sessile, all 3–7-nerved, smooth, the margin minutely papillose; flowers 1–3, often solitary, inodorous, red with dark spots, to 9 cm in diameter; perianth segments to 8.5 mm long; the claws strongly twisted in upper part; nectaries fringed; anthers large, blackish-purple; style to 3.5 cm long, half as long again as ovary; capsule obovaloid, almost smooth, flattened at top. August.

Riverside meadows, in small groups. — Far East: Uss. (only S.). Gen. distr.: Jap.-Ch. (Manchuria). Described from Manchuria. Type in Leningrad. A rarity.

* **L. tigrinum** Ker-Gawl. in Bot. Mag. XXXI (1810) tab. 1237; Wilson Lil. East. Asia 73; Maxim. in Bull. Soc. Nat. Moscou (1879) 62. — Ic.: Elwes Monogr. Lil. tab. 38.

Perennial; bulb white, ovaloid, 4–7 cm long; stem 1–2 cm long, rather densely covered with white arachnoid hairs; leaves 3–18 cm long and 0.5–1.5 cm broad, 5–7-nerved, with almost black bulblets in axils; flowers inodorous, bright orange-red, spotted; perianth segments 7–10 cm long and 1–2.5 cm broad. July-September.

Most probably the most ancient of cultivated lilies. Originating from the Jap.-Ch. region. Described from a specimen from Canton. Type in London. Maximovich reported it as growing wild from Pos'et (Ussuri), where it also grows nowadays in seminaturalized state.

291 * **L. bulbiferum** L. Sp. pl. (1753) 302; Shmal'g., Fl. II, 579. — Ic.: Rchb. Ic. Fl. Germ. X, tab. 454, f. 995.

Perennial; bulb white, ovoid; stem to 1 m long, hairy at base; leaves linear-lanceolate, with bulbils in the axils, to 10 cm long; flowers in a 1–5-flowered umbellate inflorescence, erect; perianth campanulate-funnelform, bright orange-red; nectaries fringed. July-August.

Grown in gardens, especially in the Ukraine; may become naturalized. Growing wild in mountain meadows. Centr. Eur. Described from N. Italy. Type in London.

8. **L. callosum** Sieb. et Zucc. Fl. Jap. I (1839) 86, tab. 41; Wilson Lil. East. Asia 87. — L. mandshuricum Gandoger Bull. Soc. bot. Fr. sér. 4, XIX (1919) 292. — Ic.: Elwes Monogr. Lil. tab. 41. — Exs.: HFR No. 2382.

Japanese: "no-hime-iuri".

Perennial; bulb white, semiglobose, 1.5–2.5 cm long and broad; scales few, oval-lanceolate to lanceolate; stem slender, smooth, 30–80 cm long; leaves alternate, sessile, linear to linear-lanceolate, 3–13 cm long, 1–6 mm broad, often terminating in a callous hood; flowers inodorous, red, nodding, solitary or in a sparse erect 2–9-flowered raceme; perianth segments 1–1.5 cm long, initially erect, at length strongly twisted, 2.5–4 cm long, 5–8 mm broad, terminating in a rounded callosity; nectaries pubescent-margined; pollen orange-red; capsule oblong-ovaloid, 3–4 cm long, 1.5–2 cm across, bluntly ribbed, truncate. July-August. (Plate XVII, Figure 7, a).

Riverside meadows and meadow slopes. — Far East: Uss. Gen. distr.: Jap.-Ch. Described from the vicinity of Nagasaki in Japan.

9. **L. tenuifolium** Fisch. in Hort. Gorenk. ed. 2 (1812) 8; Wilson Lil. East. Asia 83; Turcz. Fl. baic.-dah. II, 212; Ldb. Fl. Ross. IV, 151. — L. pumilum DC. in Redouté Lil. VII (1813) 378. — L. linifolium Hornemann in Hort. Hafn. I (1813) 326. — Ic.: Elwes Monogr. Lil. tab. 42. — Exs.: HFR No. 1939, 2380.

Perennial; bulb white, narrowly ovaloid, 2.5–4 cm long, 1.5–4 cm broad; stem slender, smooth or rough by short hairs, 18–80 cm long; leaves numerous, linear, gather on the upper part of stem, upright, 3–10 cm long, 1–3 mm broad, slightly revolute, obscurely denticulate, prominently 1-nerved and minutely papillose beneath; flowers faintly aromatic, nodding, in bud smooth or slightly pubescent, bright red, spotless or nearly so, solitary or in a 2–6-flowered raceme; pedicels 2–5 cm long, recurved; very close to flower, with 1–3 subulate bracts; perianth segments strongly
292 reflexed, oblong-lanceolate; anthers 6–8 mm long, bright red; capsule erect, oblong-ovaloid, 2–3 cm long, bluntly ribbed, truncate. June-July. (Plate XVII, Figure 5, a).

Exposed mountain slopes, in sparse plant communities. E. Siberia: Ang.-Say., Yen., Dau.; Far East: Ze.-Bu., Uss. Gen. distr.: N. Mong., Jap.-Ch. (Manch., Korea, N. China).

Economic importance. Bulb edible; ornamental.

10. **L. cernuum** Kom. in A.H.P. XX (1901) 461; Wilson Lil. of East. Asia 86.— L. Palibinianum Yabe in Tokio Bot. Mag. XVII (1903) 134.— L. graminifolium Lev. et Van. in Fedde Repert. sp. nov. V (1908) 283.— Ic.: Nakai in Ic. Pl. Koisikav. III (1916) tab. 178.

Perennial; bulb ovaloid, white, 3–3.5 cm long, 2.5–3.5 cm in diameter; scales thick, tightly imbricate, lanceolate to oval; stem slender, firm, smooth, 30–60 cm long; leaves numerous, gather on the middle part of stem, sessile, linear, 4–18 cm long, 1–5 (commonly 2) cm broad, upright, often revolute; flowers agreably scented, nodding, lilac with dark purple spots, solitary or in a small 2–6-flowered raceme; pedicels 6–10 cm long, ascending, curved below the flower; bracts and bracteoles subulate, foliaceous; perianth segments reflexed, oblong to oblanceolate, 3–4.5 cm long, 0.8–1 cm broad, nectaries densely fringed; anthers relatively broad, 1.5 cm long, lilac; capsule erect, globose or obovaloid, 1.2–2 cm long, 1–1.5 cm in diameter, bluntly ribbed, flattened at the top. July-August.

Sunny grass slopes, in groups.— Far East: Uss. Gen. distr.: Jap.-Ch. (Korea, E. Manch.). Described from the upper reaches of the Yalu River. Type in Leningrad.

11. **L. Ledebourii** Boiss. Fl. Or. V (1881) 175; Grossg., Fl. Kavk. I, 218.— L. monadelphum var. Ledebourii Baker Journ. Linn. soc. XIV (1875) 246.— L. pyrenaicum Ldb. Fl. Ross. IV, 150 (non Gouan).—

Perennial; bulb...; stems to 1 m long, densely leafy, smooth; leaves narrowly linear, glabrous, sometimes ciliate-margined, 3-nerved, lanceolate; pedicels twice the length of bracts, drooping at the ends; flowers 1–3, the terminal 5–6 cm long, pale yellowish-green to almost white, with dark red dots; perianth segments lanceolate, strongly narrowed toward base, strongly reflexed from the middle; anthers pale yellow; nectaries not fringed; capsule 5 cm long and 3 cm in diameter, convex at the top, with 6 rounded ribs. May-June. (Plate XVII, Figure 6).

Mountain woods.— Caucasus: Tal. Endemic. Described from the locality of Drych, at an altitude of 1450 m, in Talysh. Type in Leningrad.

293 12. **L. ponticum** C. Koch in Linnaea XXII (1849) 234; Grossg., Fl. Kavk. I, 218; Miscz. in Trav. Mus. Ac. Sc. Petr. VIII (1911) 191.— L. artvinense Miscz., l.c.— Exs.: Pl. Cauc. exs. No. 17.

Perennial; bulb...; stem to 1 m long, rather slender, scabrous, nearly leafless on lower third, densely leafy above; leaves upright, lance-linear, to oblong-lanceolate, cuspidate, papillose on the margin and on the veins beneath; raceme loosely 1-7-flowered; pedicels 2-3 times the length of bracts, drooping at the ends; flowers of medium size, bright yellow; perianth segments 3.5-4 cm long, 6-7 mm broad, lanceolate, strongly reflexed, ciliate-margined, in lower part dark-spotted; filaments papillose; anthers vermilion; pollen pale yellow; capsule stipitate, oblong-clavate, bluntly ribbed. May-June.

Wood margins and glades. — Caucasus: W. and S. Transc. **Gen. distr.**: Lazistan (Asia Minor). Described from Rize District. Type in Berlin.

13. **L. Kesselringianum** Miscz. in Bull f. angew. Bot. VII (1914) 251; Tr. Prikl. Bot. l.c.; Grossg., Fl. Kavk. I, 218. — Ic.: Miscz. l.c. f. 711, I; 712, III, 774.

Perennial; bulb broadly ovaloid, 5 mm long, 6 cm across, yellow; stem ca. 60 cm long, smooth; leaves lanceolate, smooth; flowers 1-3, stramineous, smooth; perianth segments lanceolate, ca. 8.5 cm long and 2 cm broad, the outer narrower than the inner; stigma and anther reddish-brown; ovary ovaloid-prismatic; style more than twice the length of ovary (3.5 cm long). May.

Subalpine meadows and scrub. — Caucasus: W. Transc. Endemic. Described from Bakhmaro in Batumi District. Type in Tiflis.

14. **L. monadelphum** M.B. Fl. taur.-cauc. I (1808) 267; Ldb. Fl. Ross. IV, 150; Grossg., Fl. Kavk. I, 219; Shmal'g., Fl. II, 509. — Ic.: M.B. Cent. pl. rarior. Ross. I, tab. 4; Bot. Mag. tab. 1405; Miscz. Bull. f. angew. Bot. (Trudy Byuro Prikl. Bot.) VII (1914) f. 711 III, 712a; 713 I, 775. — Exs.: HFR No. 790; Pl. Cauc. exs. No. 259; Pl. or. exs. No. 329.

Perennial; bulbs large, ca. 3.5 cm long, ovaloid; scales yellowish, narrow, acute, rather loosely imbricate; stem ca. 1 cm long, relatively stout, densely leafy nearly throughout; leaves upright, rather broadly lanceolate, acute, many-nerved, papillose on the margin and on the veins beneath, rarely smooth (var. glaber Miscz.), the upper ones shorter than the rest; flowers 1-30, aromatic, in a pyramidal raceme; bracts lanceolate; pedicels drooping at the ends; perianth narrowly campanulate, pale yellow; perianth segments oblanceolate, falcately recurved at tips, the inner surface dotted; stamens united into a tube below the middle or
294 distinct and then flat in lower part, hyaline-petaloid; anthers yellow; ovary cylindric-prismatic; style green; stigma green; capsule 4 cm long, 2.5 cm in diameter, smooth. May-July. (Plate XVII, Figure 3).

Forest glades and margins in the subalpine zone. — Caucasus: Cisc., Dag., W. Transc. Endemic. Described from Mount Beshtau. Type in Leningrad.

Economic importance. Ornamental; suitable for export.

15. **L. Szovitsianum** Fisch. et Avé Lallem. in Ind. H. Petrop. VI (1839) 16; Ldb. Fl. Ross. IV, 150; Grossg., Fl. Kavk. 219. — L. monadelphum var. Szovitsianum Baker ex Boiss. Fl. Or. V (1889) 174. — L. colchicum Stev. ex Boiss. l.c. — Ic.: Miscz. in Bull. angew. Bot. (Tr. Byuro Prikl. Bot.) VII (1914) tab. 117, f. 711, II; 712 b; 713, 2; 775. Exs.: Pl. orient. exs. No. 329.

Perennial; bulbs 6 cm long and 4 cm across; scales loosely arranged, narrow, ca. 1 cm broad; stem to 1 m long; leaves fairly broadly or narrowly lanceolate, about 20-nerved, papillate beneath, appearing stiffly hairy; inflorescence as in the preceding species; flowers ca. 10 cm in diameter, mostly in a 4-flowered raceme; perianth segments oblong-lanceolate, narrowed toward base, ca. 8 cm long (var. carthalinicum Miscz.) or 4–4.5 cm long (var. armenum Miscz.), yellow; anthers vermilion; filaments distinct, terete-triquetrous, thickened below; ovary obturbinate; stigma dark purple; capsule ca. 3 cm long and 2 cm in diameter, flat-topped. July.

Woods, forest glades and forest margins on mountain slopes of the timber and subalpine zones. — Caucasus: W. and S. Transc., rarely E. Transc. Described from Kolkhida [Colchis] in W. Transc. Type in Leningrad.

Economic importance. Ornamental; recommended for export.

Subgenus II. **CARDIOCRINUM** Endl. Gen. pl. (1837) 141. — Leaves large, cordate, long-petioled, with reticulate venation; bulb monocarpic, scaly, formed by a small number of leaf sheaths; flowers funnelform, somewhat saccate at base; style elongating after anthesis.

* L. cordifolium Thunberg in Trans. Linn. Soc. II (1794) 322; Wilson Lil. East. Asia 98. — L. Glehni F. Schmidt Fl. Sachal. Flora Sakhal., Russian ed. (1874) 204 et in Mém. Acad. Sc. Petr. sér. VII, XII, No. 2 (1868) 187. — Cardiocrinum cordatum Makino in Tokyo Bot. Mag. XXVII (1913) 124. — C. Glehni Makino ibid. 125. — Ic.: Elwes Mon. Lil. tab. I et in Gard. Chron. ser. 3, XXXVII (1905) 3. f.I.

Perennial; bulb white, the part exposed to light greenish-brown, ovaloid, 5–75 cm long and 4–7 cm across; scales few, acute, bearing the scar of shed petiole; stem erect, 0.6–1.2 (and up to 2) m long; leaves of basal
295 rosette with petioles the length of blade, deeply cordate, prominently reticulate-nerved; cauline leaves mostly on the middle third of stem, broadly oval, reniform-cordate at base; flowers in a 4–10-flowered raceme, white-farinose, green at base, mostly horizontally spreading; anthers yellow; capsule 5–5.5 cm long, cuspidate. August.

Banks of brooks and scrub. — Far East: Sakh. (only S.). Gen. distr.: Jap.-Ch. (Tsushima Island, N. Japan, Kurile Islands). Described from Japan. (L. Glehni F. Schmidt from Cape Soni on Sakhalin). Type in Uppsala. (L. Glehni in Leningrad).

Genus 269. **KOROLKOWIA*** RGL.**

Gartenfl. (1873) 161, t. 760.

Flowers funnelform-campanulate; perianth segments subequal, clawed; nectaries groove-shaped; stamens with versatile dorsifixed anthers; style undivided, truncate; capsule winged; stem leafy; inflorescence a many-flowered raceme; bulb yellow, consisting of a single scale, large.

* A genus named for N.I. Korol'kov, who introduced bulbs for cultivation in the Botanical Garden.

** Arranged by A.S. Lozina-Lozinskaya.

1. K. Sewerzowii Rgl. in A.H.P. II (1873) 320. — Fritillaria Sewerzowii Rgl. in Bull. Soc. Nat. Mosc. XLI, 2 (1868) 443. — Ic.: Gartenfl. (1873) tab. 760. — Exs.: Herb. Fl. As. Med. No. 3.

Perennial; bulb 3-4 cm in diameter, globose, yellow; stem 20-50 cm long, erect, glabrous, pale green, violet below, covered with waxy bloom, the leaves evenly distributed except for the leafless lower part; leaves alternate, the lower broadly oval, to 15 cm long, to 18 cm broad, obtusish to subacuminate, the upper broadly lanceolate, acute, often longer than the lower, all subamplexicaul at base, with decurrent margins, glaucous due to waxy bloom, obscurely nerved; floral leaves narrowly lanceolate, 3-nerved; inflorescence terminal; pedicels nodding, lilac-brown, much shorter than perianth; upper flowers staminate, the others perfect; perianth funnelform-campanulate; segments 6, subequal, fleshy, reflexed from the middle, in lower part twisted laterally compressed, carinate, in upper part oval, recurved, acuminate, terminating in a tuft of hairs, greenish-yellow, outside brownish-violet up to or above the middle, inside lustrous, with a semicircular brownish-violet stripe at throat; nectary groove-shaped, fringed; stamens slightly shorter than perianth, the outer
296 longer than the inner; filaments dark reddish-violet, minutely ciliolate, slightly dilated below; anthers light yellowish-green, dorsifixed; style with triquetrous divergent style and sessile triangular stigmas; capsule 4.5 cm long, 3.5 cm in diameter, the irregular margin gradually passing into a wing 0.5 cm broad, the base narrowed, the top obtusish, the wings gradually disappearing toward base, rounded at apex. April. (Plate XVIII, Figure 3, a-d).

Foothills, argillaceous and stony slopes, and juniper woods. — Centr. Asia: T.Sh. (W.), Syr D., penetrating into N. Pam.-Al. Endemic. Described from Kara-tau (W. and Centr. parts) from Boroldai. Type in Leningrad.

Note. Uzbek: agla; the bulbs with a high starch content, used in fodder, in spite of their bitter flavor (used for flavoring bread).

Genus 270. **RHINOPETALUM*** FISCH.**

Fisch. ex Alexand. in Edinb. N. Philos. Journ. VIII (1830) 19.

Flowers campanulate; perianth of 6 equal petaloid lobes, the nectaries projecting as spurs, more conspicuously in outer segments, the flowers sometimes zygomorphic due to the spur of upper segments being much larger than the others; stamens with immobile basifixed anthers; terminal flowers always staminate; style with undivided truncate stigma; capsule globose, winged or wingless, narrowed into a stipe, 6-angled, 3-loculed; stems leafy; racemes terminal, many-flowered; bulb consisting of 2 fleshy scales, with a long leafless sheath.

1. Flowers zygomorphic; anthers subglobose . . . . . 2.
\+ Flowers actinomorphic; anthers oblong . . . . . 4.
2. Perianth segments checkered; plants shaggy throughout . . . . . 3.
\+ Perianth segments not checkered; plants glabrous or rarely the leaves shaggy-margined . . . . . 3. Rh. arianum A. Los. et Vved.
3. Capsule wingless . . . . . 1. Rh. Karelini Fisch.

* From Greek rhinos, nose, alluding to shape of nectaries, and petalon, petal, to suggest nose-shaped petals.

** Arranged by A.S. Lozina-Lozinskaya.

+ Capsule winged . . . . . 2. Rh. gibbosum (Boiss.) A. Los. et Vved.
4. Flowers broadly campanulate . . . . . 4. Rh. bucharicum Rgl.
+ Flowers with nearly flat limb . . . . . 5. Rh. stenantherum Rgl.

297 1. **Rh. Karelini** Fisch. in New. Philos. Journ. Jan. (1830) 19; Ldb. Fl. Ross. IV, 148.— Fritillaria Karelini Rgl. ex Baker in Journ. of Linn. Soc. XIV (1875) 268.— Ic.: Sweet Gard. ser. 2, tab. 183; Gartenflora (1877) tab. 796.

Perennial; bulb ca. 1 cm long, white, with yellowish outer scales; plants grayish due to short shaggy hairs; stem 10–20 cm long; leaves alternately scattered or crowded, amplexicaul, oblong-lanceolate to oblong-oval, narrowed at both ends, acuminate; upper leaves more distant and passing into bracts, these linear, paired, equaling or longer than flower, slightly undulate-margined; lower leaves to 5 cm long, 1.5 cm broad; floral leaves shorter, ca. 2 mm broad; flowers in a terminal raceme, nodding or declined; pedicels shorter than to as long as flower; perianth segments oblong-oval, 3–5-nerved, 10–15 mm long, rosy-violet with a dark spot at base or dark-dotted and checkered in middle part, shaggy on the back; nectary on one outer perianth segment calcarate and curved inward, not projecting outward, the other nectaries smaller; filaments short, slightly dilated, hairy-margined, slender in lower part, much longer than the subglobose to broadly ovaloid anthers; pistil slightly shorter than stamens; capsule narrowed into a stipe, subglobose, 1.5 cm long, wingless, inconspicuously ribbed, obtusish at top, toothed at the ends of ribs. March-April.

Steppes, sandy or argillaceous soils, and mountain slopes.— Centr. Asia: Ar.-Casp., Balkh., Kara K. (W.), Mtn. Turkm. Endemic. Described from Uralsk steppe. Type in Leningrad.

2. **Rh. gibbosum** (Boiss.) A. Los. et Vved. comb. nov.— R. Boissieri Klatt. in Hamb, Gartenzeit. XVI (1860) 439.— Fritillaria gibbosa Boiss. Diagn. Pl. nov. 1, VII (1846) 107.— F. pterocarpa Stocks in Hooker's Journ. of Bot. IV (1852) 180.— F. Karelini Fisch. f. gibbosa Bornm. Pl. Straussianae in Beih. Bot. Centr. XXIV (1908) 99.— Ic.: Bot. Mag. t. 6406.

Perennial; bulb with white scales, 1.5 cm long; stem 15–20 cm long, more or less shaggy with short hairs; lower leaves elliptic-lanceolate, 3–5 cm long, 6–15 mm broad, the upper linear, acute, shorter than the lower; flowers zygomorphic, nodding, campanulate; perianth segments rose, with numerous darker nerves, faintly violet-checkered about the middle, oval-lanceolate, 12–15 mm long, 7–9 mm broad; nectaries equal, calcarate, shaggy on the outside, obtusish; filaments dilated in lower part, hairy throughout; anthers globose-ovoid, violet-azure; ovary toothed at top; capsule winged, the narrow wing with serrate-undulate margin, the apical tooth acute. March-May.

298 Stony slopes.— Caucasus: S. Transc.; Centr. Asia: Mtn. Turkm. (Gaudan). **Gen. distr.**: Iran. Described from Persepolis. Type in Geneva; cotype in Leningrad.

Note. R. gibbosum (Boiss.) A. Los. et Vved. represents a connecting link between two pairs of species of the genus Rhinopetalum Fisch., i.e., Rh. Karelini, Rh. arianum and Rh. bucharicum,

Rh. stenantherum, as it displays characteristics of both pairs. It resembles Rh. arianum in the shape of perianth segments and differs in having a checkered pattern on perianth segments and glabrous stems. The characteristics shared with Rh. bucharicum and Rh. stenantherum are the winged capsule and the somewhat oblong anthers.

3. **Rh. arianum** A. Los. et Vved. sp. nova in Addenda III, p. 738. — Exs.: HFR No. 490, sub F. Karelini Fisch.

Perennial; bulb yellowish, to 2 cm in diameter; stem up to 40 cm long, 6 mm in diameter, glabrous, smooth; leaves glaucescent, glabrous, the lower short linear-lanceolate acuminate, 10–14 mm broad, the middle alternate narrowly linear-lanceolate strongly acuminate 2–5 mm broad; floral leaves paired, as long as or shorter than the middle ones, equaling the flowers; raceme 1–8-flowered; flowers on pedicels 2–2½ cm long, elongating after anthesis, curved in upper part, acuminate [compare Latin description]. Perianth segments oval-lanceolate, to 22 mm long, 7–9 mm broad, pale rose, darker at the middle, purple-nerved, with a yellow spot at base within, dark-dotted on the outer surface; nectaries calcariform, one of the outer large, the others subequal small; stamens half the length of perianth; anthers subglobose, purple; filaments pubescent; pistil slightly longer than stamens; style pale green with punctate stigma, capsule stipitate, wingless, subglobose, obtuse at top, with a cusp at the end of ribs, ca. 1.8 mm long and broad. March. (Plate XVIII, Figure 1, a–d).

Sand dunes, shifting sands, and slopes. — Centr. Asia: Kara K., Mtn. Turkm. Endemic. Described from Kushka. Type in Tashkent.

4. **Rh. bucharicum** (Rgl.) A. Los. comb. nov. — Fritillaria bucharica Rgl. in A.H.P. VIII, 1 (1883) 652. — Ic.: A.H.P. VIII tab. 3; Gartenflora (1884) tab. 1171. — Exs.: Editio H.B.P. No. 5.

Perennial; bulb subglobose, with membranous scales, 1–2 cm in diameter; stem erect or slightly curved, 15–30 cm long, glabrous below,
301 in upper part at base of bracts shaggy-pubescent; leaves alternate, the lower broadly ovate-elliptic to 8 cm long and 4 cm broad subamplexicaul, the upper lanceolate, the floral linear-lanceolate paired 2 mm broad; panicle terminal, many-flowered; flowers borne singly in the axils of the paired bracts; pedicels to 2 cm long, erect at anthesis, at length nutant; terminal flower staminate, the others perfect; perianth white, green or faintly violet at base within, with 3–5 greenish longitudinal nerves, campanulate; perianth segments oblong-oval to lanceolate, 1.5–1.8 cm long, 0.4–0.5 cm broad, often with very elongate broad pubescent tip, subequal; nectaries calcariform, very prominent, dark green and violet dotted outside, shaggy; stamens one-third the length of perianth; filaments slender, densely pubescent, about as long as the oblong greenish anthers; pistil with entire stigma, about equaling or exceeding the stamens; capsule stipitate, winged in upper part. March.

Slopes and banks of mountain streams. — Centr. Asia: Pam.-Al. Endemic. Described from E. Bukhara (Pyandzh and Murgab rivers). Type in Leningrad.

5. **Rh. stenantherum** Rgl. in A.H.P. III (1873) 204. — Fritillaria stenanthera Rgl. in A.H.P. VIII (1883) 652. — Ic.: Izv. O-va lyubit. estestv., antrop. i etnogr. XXI, pt. 2 (1876) tab. XXII, f. 1–5.

Plate XVIII

1. Rhinopetalum arianum A. Los. et Vved.: 1a) flower, 1b) capsule, 1c) stamen, 1d) bulb.— 2. R. stenantherum Rgl.: 2a) flower, 2b) capsule, 2c) stamen, 2d) pistil.— 3. Korolkowia Sewerzovii Rgl.: 3a) capsule, 3b) stamen, 3c) perianth segment, 3d) bulb.

Perennial; bulbs small, to 1 cm long, white; stem 6–15 cm long, rarely longer, in lower part sulcate, the leafy part often shaggy with short hairs; lower leaves commonly approximate, to 5 cm long, 2 mm broad, amplexicaul; upper leaves 1–3, sometimes absent, much longer, alternate; floral leaves paired, linear, upright, shorter than the lower; all leaves glabrous, rather firm, glaucescent; raceme 1–8-flowered; pedicels short, recurved; perianth segments 12–22 mm long, 4–7 mm broad, pale rosy-violet with 3 greenish nerves, in the spur area dark, violet-brown to greenish-brown, oval-lanceolate, obtusish or with blunt elongate points, 12–18 mm long, 0.4–0.6 cm broad, pubescent at base and at apex; nectaries calcariform, similar on all perianth segments, though somewhat larger on the outer, hence flowers symmetric; stamens at most half the length of perianth; filaments slender, slightly dilated below, white-pubescent, as long as the oblong anthers; capsule subglobose, narrowed into a stipe, narrowly winged, the wings toothed at apex. April. (Plate XVIII, Figure 2 a–d).

Gravelly and stony slopes. — Centr. Asia: Pam.-Al., Syr D., T. Sh. Endemic. Described from Bogun, in Kara-tau foothills. Type in Leningrad.

302 Genus 271. **FRITILLARIA** * L.**

Gen. Pl. ed. II (1742) No.330.– Amblirion Rafin. in Journ. phys. LXXXIX (1819) 102.– Corona Fisch. et R. Grah. in Edinb. N. Phil. Gen. (1789) 49.– Imperialis Adans. Fam. II (1763) 48.– Morucodon Salisb. Gen. Pl. Fragm. (1866) 56.

Perianth campanulate or turbinate; perianth segments 6, petaloid; nectaries above the base in the shape of a triangular, oval or round pit, often prominent outside, thus segments appearing curved at a right angle and the flower turbinate or cylindric; stamens 6, inserted at base; style 3-fid; capsule 6-angled, 3-locular, winged or wingless; stem leafy; bulb of 2–4 or numerous fleshy scales.

1. Bulb of 4 fleshy scales, large; flowers in an umbel (Section Petilium L.) . . . . . 2.
+ Bulb of 2 fleshy scales or numerous small scales, small; flowers solitary or in a raceme . . . . . 3.
2. Perianth yellowish-green . . . . . 22. **F. Raddeana** Rgl.
+ Perianth red . . . . . 23. **F. Eduardi** Rgl.
3. Bulb of 2 fleshy scales; flowers solitary or in a raceme (Section Eufritillaria Boiss.). . . . . 4.
+ Bulb of numerous small scales, sometimes the outer ones stalked ("eyelets"). (Section Liliorhiza Kellog.) . . . . . 24.
4. All leaves alternate . . . . . 5.
+ Leaves opposite or verticillate, sometimes the middle ones alternate. . . . . 19.
5. Stem always 1-flowered (Caucasian species) . . . . . 10.
+ Stem 1–5-flowered . . . . . 6.
6. Flowers yellowish-green . . . . . 1. **F. pallidiflora** Schrenk.
+ Flowers reddish or bright violet . . . . . 7.
7. All leaves alternate . . . . . 8.
+ Upper and lower leaves approximate, the upper sometimes in 3's, the middle alternate . . . . . 2. **F. montana** Hoppe.

* From Latin fritillus, a dicebox, referring to shape of perianth.
** Arranged by A.S.Lozina-Lozinskaya.

8. Capsule winged, 6-angled; floral leaves spirally twisted . . . . . 3. F. ruthenica Wikstr.
+ Capsule obtusely 3-angled; floral leaves not twisted. . . . . 9.
9. Capsule acuminate; pedicels exceeding the uppermost leaf; flowers faintly checkered . . . . . 4. F. meleagroides Patrin.
+ Capsule obtusish; pedicels shorter than the uppermost leaf; flowers conspicuously checkered . . . . . 5. F. meleagris L.
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10. Perianth unicolor . . . . . 11.
+ Perianth in upper part yellow, in lower part violet or purple, or purple with a longitudinal yellow band . . . . . 17.
11. Flowers yellow . . . . . 6. F. lutea Mill.
+ Flowers purple, brown or violet . . . . . 12.
12. Perianth turbinate-campanulate . . . . . 13.
+ Perianth conical or campanulate . . . . . 14.
13. Stem to 15 cm long; perianth lighter-colored, greenish-brown, faintly checkered . . . . . 7. F. Kotschyana Herb.
+ Stem to 30 cm long; perianth darker, dark brownish-purple, conspicuously checkered violet-purple . . . . . 8. F. latifolia Willd.
14. Perianth to 5 cm long, broadly campanulate . . . . . 9. F. grandiflora Grossh.
+ Perianth to 3 cm long, narrowly campanulate or conical-campanulate. . . . . 15.
15. Style with entire or obsoletely 3-lobed stigma . . . . . 16.
+ Style rather deeply 3-fid, with 3 stigmas . . . . 10. F. orientalis Adam.
16. Filaments glabrous . . . . . 11. F. caucasica Adam.
+ Filaments shaggy . . . . . 12. F. armena Boiss.
17. Perianth segments purple, with a yellow longitudinal band. . . . . 13. F. kurdica Bois. et Noe.
+ Perianth segments in lower part violet or purple, in upper part yellow. . . . . 18.
18. The borderline between the colors of lower and upper parts of perianth distinct . . . . . 14. F. Michailovskyi Fom.
+ The borderline between the colors of lower and upper parts of perianth indistinct . . . . . 15. F. Grossheimiana A. Los.
19. Upper and lower leaves paired, the middle alternate or verticillate. . . . . 20.
+ All leaves verticillate, rarely the lower paired . . . . . 22.
20. Perianth tubular-campanulate, the segments at the site of nectary curved at right angle . . . . . 16. F. Walujewi Rgl.
+ Perianth broadly campanulate, the segments slightly incurved . . . . 21.
21. Distance between flowers and leaves equaling the leafy part of stem; flowers brownish-violet. . . . . 17. F. Regelii A. Los.
+ Distance between flowers and leaves shorter than the leafy part of stem; flowers yellowish-green, purple-tipped . . . . . 18. F. Olgae Vved.
22. Flowers dark brownish-purple, large, narrowly campanulate . . . . . 19. F. ussuriensis Maxim.
+ Flowers light-colored, yellowish or rosy-green . . . . . 23.
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23. Stem 1-flowered; leaves rarely with twisted tips . . . . . 20. F. ferganensis A. Los.
+ Stem many-flowered; floral and cauline leaves always with strongly twisted tips . . . . . 21. F. verticillata Willd.

24. Stem with a single leaf whorl . . . . . 25.
\+ Stem with numerous leaf whorls . . . 24. **F. kamtschatcensis** (L.) Fisch.
25. Perianth segments obovate, obtusish . . . . . 25. **F. dagana** Turcz.
\+ Perianth segments oblong-elliptic, strongly tapering at both ends, acute . . . . . 26. **F. Maximoviczii** Freyn.

Section **EUFRITILLARIA** Boiss. Fl. Or. V (1884) 177. — Sect. Fritillaria ex Ldb. Fl. Ross. IV, 145. — Sect. Petilium Ldb. Fl. Ross. IV, 147, p.p. — Bulb small, 1–1.5 cm in diameter, consisting of 2 fleshy scales; flowers solitary or in a few-flowered raceme.

Series 1. **Alternifoliae** A. Los. — Leaves alternate; flowers in a terminal raceme or rarely solitary; perianth campanulate.

1. **F. pallidiflora** Schrenk, Enum. Pl. nov. II (1842) 5; Ldb. Fl. Ross. IV, 148, 187. — Ic.: Gartenflora (1857) t. 209.

Perennial, glabrous throughout, pale green, glaucescent with waxy bloom; stem to 80 cm long, erect, 5–7 mm in diameter; leaves alternate, broadly lanceolate, acuminate, 7–13 cm long, 2–3.5 cm broad; upper leaves shorter and narrower, sessile, sometimes gathered in a whorl, the lower semiamplexicaul; floral leaves linear-lanceolate, strongly acuminate, commonly paired at base of pedicels; flowers nodding, 1–5 in a sparse raceme; pedicels erect, recurved at the ends, 5–9 cm long; perianth campanulate, 2.5–4.5 cm long, 2.5–3 cm in diameter; segments pale yellow, with darker translucent nerves, turning brown after anthesis, checkered pale brown within, greenish and red-spotted below; nectaries deep, oval; outer perianth segments oblong-obovate, round-tipped, curved at a right angle at the site of nectary; inner segments slightly shorter than the outer, ovate-spatulate, narrowed toward base, slightly acuminate, curved at an obtuse angle; stamens shorter than the pistil, the filaments appressed to style; stigma deeply dissected; capsule winged, oblong, to 2.5 cm long and 2 cm broad, rounded at top; flowers with a faint unpleasant odor. May-June.

Slopes of the subalpine zone. — Centr. Asia: Dzu.-Tarb., T. Sh. Gen. distr.: Dzu.-Kash. (Kuldja). Described from Dzungaria Ala Tau. Type in Leningrad.

305 Note. Regel in Bull. Soc. Nat. Mosc. XLI (1868) mentions var. uniflora with a solitary flower and var. pluriflora with 2 to many flowers.

2. **F. montana** Hoppe, Flora XV, 2 (1832) 476. — F. tenella Shmal'g., Fl. II, 507; Asch. u. Gr. Synopsis III (1905–07) 190, non M.B. — F. racemosa L.D. minor Ker.-Gawl. Bot. Mag. (1809) t. 1216, non Schult. — Ic.: Rchb. Ic. Fl. Germ. X, f. 278.

Perennial; bulb small, globose; stem 20–45 cm long, erect, glabrous; leaves linear-lanceolate to linear, slightly canaliculate, obtuse, the upper and lower always gathered in pairs, the upper sometimes in 3's, the middle alternate, 7–13 cm long, 3–10 mm broad; floral leaf forming an erect tassel; flowers solitary or 2; pedicels shorter than upper leaves, suberect;

perianth dark red, broadly campanulate, checkered with yellowish within; perianth segments elliptic, 18–26 mm long, 8–12 mm broad, the outer narrower; style 3-fid nearly to the middle; capsule obovoid, flattened at top, tapering at base into a short stipe. April-May.

In meadows among shrubs. — European part: M. Dnp. (Podolia). Gen. **distr.**: Balkans, E. Europe. Described from Europe (Trieste).

3. **F. ruthenica** Wikstr. in Vet. Acad. Handl. II (1821) 353 tab. 5, f. 2; Ldb. Fl. Ross. IV, 147. — F. verticillata M. B. Fl. taur.-cauc. I (1808) 268, non Willd. — Ic.: Ldb. Ic. pl. Fl. Ross. tab. 2; Sweet. Br. Fl. Gard. IV (1838) 1343.

Perennial; bulb to 1 cm in diameter, flattened; stem 20–50 cm long, erect, slender, glabrous, smooth, leafy from middle third; leaves alternate, slightly amplexicaul, linear, acute, 6–9 cm long, 3–5 mm broad, the upper filiform, shorter, approximate, with spirally twisted tips; flowers 1–5, in a loose terminal raceme in the axils of upper leaves; pedicels curved, much shorter than perianth; perianth campanulate, dark red, faintly darker-checkered, yellowish within a greenish downward-enlarged band; outer perianth segments narrowly oval, to 3 cm long, to 8 cm broad, the inner obovate obtusely long-tipped, to 3.5 cm long and to 1.5 cm broad; nectaries shallow, rounded-oval, forming a prominent tubercle on the outside; style 3-fid to the middle, exceeding the stamens; filaments dilated below, longer than the anthers, capsule winged, 6-angled, to 2 cm long and 1.8 cm broad, flattened at top, slightly narrowed toward base. April-May. (Plate XIX, Figure 8).

Scrub, meadows, and stony places. — European part: V.-Don, U. Dnp., M. Dnp., Bl., L. Don, Transv., L. V.; Caucasus: Cisc.; W. Siberia: U. Tob.; Centr. Asia: Ar.-Casp. (N.), Balkh., T. Sh., Syr D. Described from the Caucasus.

306 4. **F. meleagroides** Patrin ex Schult. f. Syst. veget. VII, 1 (1829) 345. — F. minor Ldb. Fl. alt. II (1830) 34; Ldb. Fl. Ross. IV, 146, Shmal'g., Fl. II, 508. — F. pyrenaica Georgi Beschr. d. Russ. R. III, 4 (1775) 900, non L. — Ic.: Ldb. Ic. Pl. Fl. Ross. II, t. 130.

Perennial; bulb to 1.5 cm in diameter, flattened, globose, white, with a brown membranous tunic; stems 25–60 cm long, glabrous, smooth, leafless in lower part; leaves 3–7, alternate, linear, semiamplexicaul, attenuate toward apex, 5–15 cm long, 1–7 mm broad, straight or slightly recurved; flower solitary, terminal, pendulous, smaller than that of F. meleagris Wikstr.; pedicel longer than the uppermost leaf; perianth segments dark brownish-violet, faintly checkered or speckled, 2–3 cm long, 7–12 mm broad, the outer narrower, oblong-elliptic, narrowed, the inner oblong-obovate, obtuse and spiculate; stamens as in F. meleagris Wikstr.; style 3-fid nearly to the middle; capsule oblong-ovoid, obtusely 3-angled, capsule acuminate, to 2 cm long and 1 cm in diameter. April-May.

Steppe belt, meadows, brooks, mud flats, sometimes on solonetz. — European part: Bl., U. Dnp., V.-Don, L. Don, Transv., L. V.; W. Siberia: U. Tob., Alt., Irt.; Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from Altai.

5. **F. meleagris** L. Sp. Pl. (1753) 436; Ldb. Fl. Ross. IV, 146; Shmal'g., Fl. II, 508. — F. praecox hort. ex Ind. Sem. H. Ber. (1855) 10. — Ic.: Rchb. Ic. Fl. Germ. X, t. 442; Gartenfl. (1867) t. 550. — Exs.: Pl. Finl. Exs. No. 574.

Perennial; bulb flattened, with a brown membranous tunic, globose, 7–15 mm in diameter; leaves 2–6, alternate, borne on the upper part of stem, linear-lanceolate, tapering toward both ends, obtusish, semiamplexicaul, 8–13 cm long, 3–10 cm broad, the upper shorter and narrower; flowers commonly solitary, rarely 2, nodding; pedicel shorter than the uppermost leaf; perianth segments oblong-elliptic, slightly tapering toward apex, obtuse, subequal, the outer slightly narrower than the inner, 3–4 cm long, 1–1.5 mm broad, conspicuously checkered with dark purple and whitish; stamens paler below, about half the length of perianth segments; anthers linear, yellow; filaments two-thirds the length of anthers, gradually dilated toward base; pistil slightly exceeding the stamens; style 3-fid to 1/3; capsule obtusely 3-angled, flattened at top. May-June.

Woods, meadows, and wet places. — European part: V.-Don, L. Don, Transv., L. V., Bl. Gen. distr.: W. Europe. Described from France and Italy. Type in London.

307 Series 2. **Trichostileae** Boiss. Fl. Or. V (1884) 177 p. p. — Leaves alternate; flowers solitary; perianth turbinate; style parted to 1/4.

6. **F. lutea** Mill., Gard. Dict. ed. VIII (1768) No. 4 M. B., Fl. taur.-cauc. I (1808) 269. — F. orientalis Willd. ex Ldb. Fl. Ross. IV, 145, non Adams. — F. glaucescens Willd. ex Kunt, Enum. pl. IV (1843) 250. — Ic.: M. B. Cent. pl. Ross. tab. 41; Rchb. Ic. Fl. Germ. X (1848) t. 442. — Exs.: Pl. Or. exs. No. 152; Herb. Fl. cauc. No. 164.

Perennial; bulb white, 2 cm across; stem 15–20 cm long, 2 mm in diameter, glabrous, leafless below, bearing above the middle up to 6 alternate narrowly lanceolate (the upper linear) glabrous obtusish leaves; lower leaves 10 cm long, 1.5 cm broad; upper leaves 7–8 cm long and 3–6 mm broad; flowers solitary, nodding, borne in the axils of the terminal upright leaves; pedicels recurved; perianth turbinate, 3–3½ cm in diameter, yellow, with oblong greenish nerves and checkered on both sides or merely inside with reddish-brown transverse lines, broadly oval, tapering at base into a claw, fimbriate-margined, with an apical tuft of short white hairs; outer segments not clawed, narrowed, curved perpendicularly at the deep narrowly ovate nectary; stamens shorter than pistil; filaments slightly dilated below, appressed to style; anthers 1 cm long; style divided into 3 fleshy lobes, bearded between the lobes; capsule ovaloid-clavate, obtusely 3-angled. April-May. (Plate XIX, Figure 1, a, b).

Alpine meadows. — Caucasus: Cisc., Dag., W. and E. Transc. Endemic. Described from cultivated specimens originating from Kazbek area.

7. **F. Kotschyana** Herbert in Lindl. Bot. Reg. (1844) misc. 43. — F. latifolia β Kotschyana Boiss. Fl. Or. V (1884) 178. — F. nobilis Bak. Bot. Mag. (1896) tab. 7500.

Bulb ovaloid, less than 1 cm across; stem monanthous, 12–15 cm long, smooth, glabrous, reddish, glaucous-green above; leaves 4–6, alternate, scattered, glaucescent, semiamplexicaul, linear-elliptic, 5–6 cm long, 1–1.5 cm broad; obtuse, the upper narrower and acuminate; flower turbinate-campanulate, nodding, large, greenish-red, checkered, paler and more yellow within; perianth segments elliptic, obtuse, to 4 cm long, the inner 2 cm the outer 1 cm broad; nectaries small, shallow; stamens shorter than perianth; anthers pale yellow; filaments dilated below; style 3-parted to 1/3; capsule oblong-obovoid, obtusely angled, ca. 2 cm long. May-June.

Mountain woods. — Caucasus: Tal. **Gen. distr.**: N. Persia. Described from plants grown at Manchester from bulbs obtained from El'brus.

308 8. **F. latifolia** Willd. Sp. Pl. II (1799) 92, Ldb. Fl. Ross. IV, 145. — F. esculenta Adams in Wed. et Mohr. Beitr. I (1805) 52. — Ic.: Bot. Mag. t. No. 853, 1207; Redouté Lil. (1802) tab. 151.

Perennial; bulb flattened-globose, to 1.5 cm across, white, consisting of 2 fleshy scales, bearing numerous small bulblets between the scales; stem to 30 cm long, leafless to the middle, rather densely leafy in upper part, glabrous, smooth; leaves alternate, the upper broadly elliptic to narrowly lanceolate, the lower to 8 cm long and 3 cm broad, the upper 3 cm long and less than 1 cm broad, acuminate, many-nerved, rather firm, thickish, light green, glabrous; flowers solitary, terminal; pedicels recurved to nutant, becoming erect in fruit; perianth turbinate, dark violet-purple, checkered with yellow inside, with a greenish bloom on the outer surface; inner perianth segments oblong-obovate, 3.5 cm long, 2–2.5 cm broad; outer segments oblong-elliptic, slightly tapering toward base, 1–1.5 cm broad; filaments slightly dilated below, as long as anthers; pistil 3-fid to 1/3, as long as stamens; capsule to 3 cm long, 13 mm broad, cylindric, slightly narrower at base, obtusish, with rounded ribs. April-May.

Subalpine and alpine zones; slopes with clay soil, and meadows. — Caucasus: Cisc., W. and E. Transc. Endemic. Described from cultivated specimens. Type in Berlin.

9. **F. grandiflora** Grossh., Mon. Jard. Bot. Tifl. XIII–XIV (1919) 52. — Ic.: Ibid. tab. V.

Perennial, glaucous throughout; stem 25–53 cm long; leaves 5–10 (mostly 7–8), alternate, the lower 1.6–2.3 mm broad, the upper much narrower; flowers solitary or 2 or 3, large, broadly campanulate; perianth segments 3.7–5.2 cm long, brownish-purple, rather faintly checkered, oblong, with an oblong-oval nectary somewhat above the base, the outer greener and narrower than the inner, all broadly triangular-tipped, acute; stamens one-third the length of perianth; filaments pubescent, half as long again as the anthers; style thick, 3-fid nearly from the middle. April.

Rocks in woods. — Caucasus: Tal. Endemic. Described from vicinity of village of Lerik. Type in Tiflis.

311 10. **F. orientalis** Adams in Web. et Mohr, Beitr. I (1805) 50. — F. tenella M.B. Fl. taur.-cauc. (1808) 269, 425.

Plate XIX

1. Fritillaria lutea Mill.: 1a) capsule; 1b) pistil.– 2. F. Maximoviczi Freyn.– 3. F. ferganensis A. Los.: 3a) capsule.– 4. F. Grossheimiana A. Los.– 5. F. Michailowskyi Fomin.– 6. F. Raddeana Rgl.: 6a) bulb.– 7. F. kamtschatcensis (L.) Ker.-Gawl. bulb.– 8. F. ruthenica Wikstr. bulb.

Perennial; bulb round in cross section, white; stem very slender, 15–40 cm long, smooth, glabrous, leafy from the middle third; leaves linear, slightly canaliculate, tapering toward apex, the upper grouped in 2's or 3's, to 8 cm long, 3–5 cm broad; flowers solitary; pedicels recurved, shorter than uppermost leaf; perianth campanulate; perianth segments oblong-elliptic, obtuse, obtusely green-tipped, the outer 3 cm long and 1 cm broad, the inner 3 cm long and 1.4 cm broad, dingy purple outside, yellowish checkered with dingy purple within; stamens about half the length of perianth; anthers shorter than filaments; style 3-fid to more than 1/3; capsule obtusely 6-angled. June.

Alpine meadows. — Caucasus: Cisc. Described from the Caucasus.

Series 3. **Olostyleae** Boiss. Fl. Or. (1884) 177, p. p. — Leaves alternate; flowers solitary; perianth campanulate; style simple or 3-parted at summit.

11. **F. caucasica** Adams in Web. et Mohr, Beitr. I (1805) 51. — F. tulipifolia M.B. Fl. taur.-cauc. I (1808) 27; `Ldb. Fl. Ross. IV, 145; Boiss. Fl. Or. V, 185. — Ic.: Bot. Mag. t. 5960; M.B. Cent. Pl. Ross. I, t. 121. — Exs.: Pl. or. exs. (1922) No. 108; HFR No. 591, sub F. tulipaefolia M.B.

Perianth; bulb white, consisting of 2 fleshy scales, up to 2 cm across; stem glabrous, smooth or very finely sulcate, 15–40 cm long, leafy from the middle; leaves 3–4, glaucous, alternate, the lower oblong-oval, to 8 cm long and 2.5 cm broad, the upper narrowly lanceolate, acuminate, all amplexicaul; flowers solitary, nodding; perianth campanulate-conical, dark reddish-violet, not checkered, cinereous outside; perianth segments 18–25 mm long, elliptic-lanceolate, many-nerved, with a narrow nectary; stamens slightly shorter than perianth, glabrous below; style simple, with 3-lobed stigma; capsule oblong-ovaloid, to 2 cm long, narrowed below. April.

Mountain slopes, scrub. — Caucasus: Cisc., E. and W. Transc., Dag. Endemic. Described from Konstantinogorsk.

Note. There are records of var. angustifolia Miscz. ex Grossh. Fl. Kavk. I (1928) 220. — all leaves linear, 2–4 mm broad. — Cisc. and Georgia (Tiflis) and var. lencoranica Miscz. l.c. — larger plants; flower larger, campanulate. — E. Transc. (Baku).

12. **F. armena** Boiss. Diagn. pl. I, VII (1846) 106. — Ic.: Bot. Mag., tab. 6365; Gartenfl. (1883) 150.

Perennial; bulb globose, 1 cm across, consisting of 2 small scales;
312 stem glabrous, slightly sulcate, 10–20 cm long, very slender, leafy in middle part; leaves 3 or 4, alternate, the lower lanceolate 4–5 cm long and to 1.5 cm broad, the upper linear much shorter, all acuminate, the lower amplexicaul; flowers solitary, rather small, nodding; perianth conical, to 20 mm long, dark red, not checkered; perianth segment elliptic-lanceolate, obtuse, ciliate at tips; nectaries small, oblong; stamens with shaggy filaments about twice the length of anther; pistil exceeding the stamens; style simple, with 3-lobed stigma. April.

Alpine zone; alpine meadows, slopes, and scrub. — Caucasus: E. and S. Transc. **Gen. distr.**: Turkish Armenia. Described from Armenia. Type in Geneva.

Series 4. **Discolores** A. Los. — Perianth campanulate, with upper and lower part differently colored or with longitudinal medial band differing in color from the margins.

13. **F. kurdica** Boiss. et Noe. in Diagn. pl. 2, IV (1859) 103; Boiss. Fl. Or. V, 183. — F. racemosa Grossh. Fl. Kavk. I (1928) 221, non Ker.-Gawl.

Perennial; bulb to 1.5 cm across; stem to 20 cm long, leafy in upper half (reckoning from the deep buried bulb); leaves alternate, the lower paired, largest, to 7 cm long and 1 cm broad; upper leaves commonly 3, narrower, the uppermost floral sublinear, 3 cm long; flowers always solitary, nodding or declined; pedicels much shorter than the campanulate perianth; outer segments oblong-oval to lance-oval, slightly acuminate, 2.5 cm long, 8 mm broad, the inner oblong-obovate, round-tipped, tapering toward base, all dark purple, checkered in lower part, with conspicuous dark longitudinal nerves and a prominent (especially within) oblong median band, the outer segments glaucescent outside; filaments dilated below; anthers short, obtuse; style as long as stamens; ovary with rounded ribs; stigma 3-lobed. May.

Mountain slopes. — Caucasus: S. Transc., Tal. **Gen. distr.**: Arm.-Kurd. Described from vicinity of Lake Van. Cotype in Leningrad.

14. **F. Michailovskyi** Fomin. in Mon. Jard. Bot. Tifl. 1 (1905) 18.

Perennial; bulb 1–1.5 cm across, white, of 2 fleshy scales; stem 10–20 cm long, sulcate; leaves 3–5, the lower approximate, sometimes nearly opposite, elliptic-lanceolate, 6–7 cm long, 1–2 mm broad, semiamplexicaul, tapering at both ends, obtuse, the upper narrowly
313 lanceolate to linear, acuminate; flowers solitary, rarely 2 or 3, nodding; perianth campanulate; perianth segments oblong-elliptic, to 30 mm long, obtusish, ciliate at tips, the lower part dark reddish-violet, the upper bright yellow, the borderline between the two parts distinct; nectaries deep, prominent outside as a large tubercle or spur; filaments ciliate, papillose, slightly longer than anthers; style as long as ovary, 3-fid to the middle. May. (Plate XIX, Figure 5).

Stony soil, slopes. Possibly occurring in S. Transc. (known from former Kars Region). **Gen. distr.**: Arm.-Kurd. Described from Mount Askor-dag. Type in Tiflis.

15. **F. Grossheimiana** A. Los. sp. nova in Addenda III, p. 739.

Perennial; bulb white, globose, 1–1.5 cm across, of 2 fleshy scales; stem 5–20 cm long, glabrous, smooth, leafless below, densely leafy from middle third; leaves alternate, approximate, glaucous, broadly lanceolate to narrowly linear; strongly acuminate, to 5 cm long; flowers 1 or 2, terminal; perianth narrowly campanulate, the inner segments oval-oblong, the outer narrower, elliptic, 1.7–2 cm long, violet outside, the inner segments yellow, checkered, the lower part darker, the upper lighter,

with no distinct borderline between the two parts (c.f. F. Michailovskyi Fomin.); style parted to 1/3; stamens about half the length of perianth. May. (Plate XIX, Figure 4).

Dry stony slopes. — N. Iran. Described from Iranian Azerbaijan, Sakhend. Type in Leningrad. Possibly occurring in S. Armenia.

Series 5. **Verticillatae** A. Los.—Leaves verticillate, sometimes the middle ones alternate; flowers in a terminal raceme or solitary.

16. **F. Walujewi** Rgl. Gartenflora (1879) 353. — Ic.: Ibid. tab. 993.

Perennial; stem glabrous, 20–30 cm long, leafy below; lower leaves opposite; middle leaves commonly in whorls of 3 or 4, the upper opposite or alternate, all linear-lanceolate; lower leaves obtuse, scarcely tapering, the middle and upper attenuate to a sharp point, the uppermost and the floral with spirally coiled tips, glaucous beneath, green above, to 10 cm long and 1.5 cm broad; flower solitary (rarely 2 or 3); nodding, tubular-campanulate; perianth segments oblong-elliptic, 5 cm long, 1.5 cm broad, with a prominent projection corresponding to nectary, subequal, whitish-green outside, brownish-purple within with whitish spots and faintly
314 checkered; nectariferous pit round; filaments longer than anthers, dilated below; pistil with a 3-lobed stigma, exceeding the anthers; ovary cylindric; capsule 2.5–3.5 cm long, 2 cm broad, flattened at top, the ribs winged. May.

Mountains. — Centr. Asia: Dzu.-Tarb.; T. Sh. Endemic.

17. **F. Regelii** A. Los. sp. nov in Addenda III, p. 739. — F. ruthenica Wikst. var. bucharica Rgl. in sched.

Perennial; bulb 1 cm across, of 2 small white scales, clothed with whitish membranous scales; stem to 40 cm long, erect, slightly sulcate, leafy only in middle part, leafless elsewhere, the upper portion of stem about as long as the leafy portion; lower and upper leaves opposite, paired, the middle alternate or sometimes opposite, the upper sometimes alternate; lower leaves lanceolate, obtuse, the middle and upper narrowly lanceolate, strongly acuminate, all upright, 6–7 cm long, 0 5–1.5 cm broad, prominently many-nerved; flowers commonly solitary (rarely 2), declined, not nodding; pedicels recurved at the ends, 1.5–3 cm long; bracts at the base of pedicels 2 or 3, linear, acute, erect, slightly twisted at the ends; perianth campanulate, brownish-violet, glaucescent outside; perianth segments oblong-lanceolate to ovate-lanceolate, narrowed toward base, with numerous darker nerves, obtusely point-tipped, 3 cm long, 9–13 mm broad; nectaries oblong, superficial; filaments dilated below, about as long as anthers; pistil shorter than perianth, the style cleft to 1/3; ovary acutely 6-angled, deeply emarginate. June.

Mountain slopes, chernozem soils, and dense plant stands. — Centr. Asia: Pam.-Al. Darvaz and Karateginskie mountains. Endemic. Described from Kulyab and from Peter the Great Range. Type in Leningrad.

18. **F. Olgae*** Vved. in Fl. Turkm. I, 2 (1932) 297. — F. serawschanica Fedtsch. in schedis.

* Arranged by O.A.Fedchenko.

Perennial; bulb 1.5–1.8 cm across, white, the outer scales light-colored, membranous; stem erect, 20–60 cm or sometimes up to 1 m long, slightly sulcate, often minutely puncticulate with reddish-lilac, with leaves rather evenly distributed from base, the distance between leaves and flowers very variable but always much shorter than the leafy portion of stem; leaves linear-lanceolate, strongly acuminate, the lowest obtuse, slightly arching; upper and floral leaves round-tipped, 6–11 cm long, 0.5–2 cm broad (3.5 cm in plants from Kugitang), in whorls of 3–6 or opposite, the lower
315 paired; flowers 1–5, erect or declined; perianth broadly campanulate, strongly narrowed toward base; segments yellowish-green outside, green on the back; inner surface lustrous, dark green with purple apex or reddish-violet throughout, the faint checkered purple pattern intensified toward the purple apex; the outer face of inner segments also purple at apex; outer segments narrowly elliptic, narrowed toward base, to 3 cm long, 0.8 cm broad, subacuminate; inner segments oblong-obovate, strongly narrowed toward base, 3 cm long, 1.4 cm broad, round-tipped or apiculate; nectaries triangular, blackish-purple, at the base of perianth segments; stamens half the length of perianth; filaments slightly dilated below; anthers acuminate; style cleft nearly to the middle; capsule 1.5–2 cm long, 2–2.5 cm broad, with winged ribs and acutely emarginate top. June.

Juniper woods, gullies, and slopes.— Centr. Asia: Pam.-Al. (Zeravshan, Kugitang). Endemic. Described from Kugitang. Type in Tashkent.

Note. Solitary-flowered forms are associated with the E. part of the distribution area (Lake Kuli-kalon). They are lower and resemble in aspect F. Regelii Los.

19. **F. ussuriensis** Maxim. in Trautv. Rgl., Maxim. et Winkl. Dec. pl. nov. (1882) 9.

Perennial; bulb small, ca. 1 cm across; stem to 60 cm long, slender, glabrous, leafless in lower third, leafy above; leaves verticillate, the upper often paired, linear, acuminate, to 15 cm long, 0.2–0.6 cm broad, the upper with characteristically twisted tips, the floral erect, with strongly twisted tips; flowers solitary, declined; pedicels slender, slightly shorter than perianth; perianth narrowly campanulate, brownish-violet outside, the inner surface purple, lilac below, checkered with yellow and yellowish-tipped; outer perianth segments oblong-obovate, obtuse-tipped, to 3.5 cm long and 1.5 cm broad; inner segments oblong-elliptic, acutish, slightly shorter and narrower than the outer, all bent at a right angle at the site of nectary; nectaries round, prominently tumid outside; stamens shorter than perianth; filaments dilated below, pubescent, longer than anthers; pistil with shaggy style and deeply lobed stigma; capsule broadly obovoid, with rounded angles and a round top. May.

Wet sandy soils, woods, meadows, and river valleys.— Far East: Uss. Endemic. Described from the Vaifudin River. Type in Leningrad.

20. **F. ferganensis** A. Los sp. nova in Addenda III, p. 740.

Bulb 1 cm across; stem very slender, finely sulcate, pale green, 25–40 cm long, with leaves evenly distributed from middle third,
316 monanthous; lower and mostly upper leaves opposite, paired, the middle in whorls of 3 or 4, linear, gradually attenuate to sharp point (this spirally coiled in upper leaves), to 12 cm long, 0.6 cm broad, the lower leaves broader and shorter, linear-lanceolate, purple; floral leaves

almost subulate, rather strongly twisted; flowers solitary, declined; pedicels much shorter than perianth; perianth broadly campanulate, slightly narrowed toward base, pale violet-rose, greenish below, checkered with greenish-brown; perianth segments ca. 3 cm long, the outer oblong-elliptic, obtusish, 0.8–0.9 cm broad, the inner oblong-obovate, prominently obtuse-tipped, 1.2–1.3 cm broad, nectaries oblong, on lower one-third of segments, prominent outside; stamens about half the length of perianth; filaments slightly dilated, longer than the obtuse anthers; pistil with deeply cleft style; capsule 1.5 cm long and broad, the wings about as broad as the angles, tapering to a point at apex, the top strongly emarginate. May. (Plate XIX, Figure 3, a).

Stony slopes and juniper thickets.— Centr. Asia: Pam.-Al. (Alai and Trans-Alai ranges, Alai Valley). Endemic. Described from the Kandur and Airtash rivers. Type in Leningrad.

Note. A species related to F. Regelii A. Los., F. Olgae Vved., and F. verticillata Willd. It differs from these species in the following characters: from F. Regelii Los. in its leaves and flower color; from F. Olgae Vved in the always monanthous stem, and the shape and color of flowers; from F. verticillata Willd. in the monanthous stem, flower color and narrower leaves.

21. F. **verticillata** Willd. Sp. pl. II (1799) 91.— F. leucantha Fisch. ex Schult. Syst. VII (1829) 393.— F. scandens Fisch. ex Schult. l.c.— F. altaica Lam. ex Schult. l.c.— Ic.: Bot. Mag., t. 5969.

Perennial; bulb globose, to 2 cm across; stem 20–60 cm long, in lower part leafless and rough due to tubercles, from middle third rather densely leafy, glabrous, smooth; lowest leaves opposite, broader than the rest; other leaves in whorls of 3–7, narrowly lanceolate to linear, 5–10 cm long, 2–10 mm broad, all leaves with strongly helicoid tips (at flowering only the tips of upper leaves coiled); flowers 1–5, nodding, campanulate; pedicels shorter than perianth; outer perianth segments oblong-elliptic, narrowed at both ends, acuminate, concave, 3–4.5 cm long, 1.5 cm broad; inner segments oblong-obovate, point-tipped, 3–4.5 cm long, 1.5–2 cm broad, yellowish white, with darker-striped outside, the inner surface checkered with pale violet; nectaries on lower one-fourth, prominently
317 tuber-shaped outside; stamens half the length of perianth; filaments dilated below, slightly longer than anthers; pistil exceeding the stamens, 3-fid to 1/3; capsule obovoid, 2–2.5 cm broad, 2.5–3 cm long, winged, 6-angled, truncate and emarginate. April.

Stony and dry slopes.— W. Siberia: Alt.; Centr. Asia: Balkh., Dzu.-Tarb. Endemic. Described from Siberia (Altai). Type in Berlin.

Section **PETILLIUM** (L.) ex Boiss. Fl. Or. V (1884) 177.— L. Gen. Pl. ed. I (1737) No. 259 (pro gen.).— Bulb large, to 8 cm across, of 4 fleshy scales, these united in lower part; flowers in a terminal umbel.

22. **F. Raddeana** Rgl. in A.H.P. X (1887) 365.— F. aschabadensis M. Michel in Journ. Soc. Hort. Fr. (1902) 195.— F. Marc.-Micheli Freyn et Sint. in sched.— Ic.: Bot. Mag., t. 7850.

Perennial; bulb to 6 cm across, broadly ovoid; robust glabrous plants; stems erect, 50–60 cm long, 1–1.5 cm in diameter, covered at the middle with alternate or subverticillate decurrent leaves, leafless in upper part;

leaves glabrous, lustrous, pale green, sessile; lower and middle leaves broadly lanceolate, slightly acuminate, to 15 cm long and 5 cm broad; upper leaves linear-lanceolate, acute; inflorescence 2–7-flowered, cymose at base, with a cluster of linear acute recurved floral leaves; pedicels declined, slightly longer than flower; flowers broadly campanulate; perianth segments pale yellow or greenish, with several yellowish-green nerves and an apical tuft of short white hairs, the outer oblong-lanceolate, the inner lance-rhomboidal; nectaries at base of segments shallow, scarcely prominent outside; filaments white, slightly dilated, shorter than the style; anthers yellowish, to 6 mm long; style 3-fid. April. (Plate XIX, Figure 6 a).

Scrub and stony slopes.—Centr. Asia: Mtn. Turkm. (in Kopet Dagh foothills). Endemic. Described from Khodzha-Kala-bami. Type in Leningrad.

23. F. **Eduardii** Rgl. in A.H.P. VIII, 3 (1883) 654, tab. II.— F. imperialis var. inodora Rgl. in A.H.P. VIII, 3 (1883) 653.— Ic.: Gartenfl. (1884) tab. 1165.

Perennial; bulb inodorous, ovaloid-ovoid, 5.6 cm long, 4–5 cm across, with 4 yellowish inner and dark brown outer scales; stem erect, sulcate, glabrous, 40–60 cm long, covered from the middle third nearly to summit
318 with evenly distributed leaves, a very short naked portion just below the inflorescence; leaves oblong-lanceolate to ovate-lanceolate, semi-amplexicaul, acuminate, slightly crisp-margined, with numerous parallel veins, to 12 cm long, 4.5 cm broad; flowers in a crowded terminal umbellate leafy inflorescence; floral leaves narrower and shorter than the cauline, forming a terminal rosette; flowers several times the length of pedicel, erect or declined (not nodding as in F. imperialis L.); perianth bright red, campanulate, 4.5 cm long; perianth segments subequal, oblong-lanceolate, the reflexed tips terminating in a minute mucro bearing a tuft of hairs; nectaries round, superficial, at the base of segments; stamens much shorter than pistil; filaments scarcely dilated, longer than anthers; pistil equaling the perianth; with a short ovary and a 3-lobed stigma; capsule broadly cylindric, 6–7 cm long, 5–6 mm broad, with winged ribs, flat at base and at top; seeds irregularly oblong-ovoid, angled. March.

Mountain slopes.— Centr. Asia (mountains of E. Bukhara). Endemic. Described from Tash-Mailik, Boratag, Pyandzh River. Type in Leningrad.

Note. The species F. Eduardii Rgl. was mentioned by A. Regel and was considered by him as synonymous with F. imperialis L. It differs, however, markedly in perianth color and the not nodding flowers, and should therefore be separated.

Section **LILIARHIZA** (Kellog) A. Los.— Liliarhiza Kellog in Proc. Calis. Acad. II (1863) 46; Sect. Petilium Ldb. Fl. Ross. IV, 147, p.p.— Bulb consisting of numerous small scales, increasing in diameter; outer scales stalked, separating from the bulb and accrescent; flowers solitary or in a raceme.

24. F. **kamtschatcensis** (L.) Fisch. ex Hook. Fl. Bor. Am. II (1840) 181; Kom., Fl. Kamch. I, 300; Ldb. Fl. Ross. IV, 147.— Lilium kamtschatcense L. Sp. pl. (1753) 303.— Ic.: Gartenfl. (1856) t. 173; Hook. Fl. bor. Am. t. CXCIII A.

Perennial; bulb up to 2 cm across, consisting of numerous 3-angled scales, the outer stalked ("eyelets"*) and serving for reproduction; stem erect, to 50 cm long and 0.8 cm in diameter, glabrous, smooth, often anthocyanin-tinged in lower third, and leafless; leaves verticillate, in whorls of 3–10, slightly amplexicaul, ovate-lanceolate, to 7 cm long, 2.5 cm broad, attenuate toward apex, subobtuse, dark green above, glaucescent beneath, with numerous dark longitudinal veins and often with broad blackish-brown longitudinal bands; leaves of upper whorls smaller; floral leaves solitary, acuminate; flowers in a close raceme of 2 or 3, rarely solitary, declined; longer than pedicel; perianth narrowly
319 campanulate-funnelform, purple, brighter within; segments rather fleshy, lanceolate, slightly revolute-margined, 2.5–3.5 cm long, 1.3–1.5 cm broad, the outer narrower, oval-lanceolate, deeply furrowed within, the marginal furrows fimbriate-verrucose; nectaries on the lower part of segments, superficial, hooded at summit; stamens with anthers attached in lower part; anthers 3-angled below, shorter than the filaments; style 3-fid nearly to the middle; capsule ovoid, 1.5–2 cm long, obtusely angled. June. (Plate XIX, Figure 7).

Woods, meadows, in dense grass stands, sandy soils, and tundra.— Far East: Kamch., Sakh., Uss. Gen. distr.: N. America. N. Japan. Described from Canada. Type in London.

Economic importance. Bulbs with a high starch and sugar content, are boiled for food and are stored for winter use. They resemble chestnuts in taste and play a considerable role in the life of the inhabitants who often use them as a substitute for bread.

25. **F. dagana** Turcz. in Flora XVII (1834) I Beibl., 25; Ldb. Fl. Ross. IV, 148; Turcz. Fl. baic.-dah. II, I (1856) 211.— F. chamarensis Turcz. ex Ldb. Fl. Ross. IV (1853) 148.— Ic.: Trautv. Imag. et descr. Fl. Ross. (1844) t. I.

Perennial; bulbs of several small scales; stem to 35 cm long, glabrous, smooth, speckled with anthocyanins especially in lower part, with a single whorl of 3–5 leaves in upper part; leaves oblong-lanceolate to ovate-lanceolate, attenuate toward apex, obtuse, rounded at base, to 8 cm long, to $1\frac{1}{2}$ cm broad, 5–7-nerved, glabrous; floral leaf solitary, oblong-ovate to ovate-lanceolate, terminating in a long-tapering obtuse tip, commonly shorter and broader than the cauline leaves; flowers solitary, nodding; pedicel shorter than perianth; perianth broadly campanulate, outside brownish-purple with a dark spot about the nectary, the inner surface orange-purple checkered with a lighter color; perianth segments oblong-obovate, to 4 cm long, obtusish; outer segments to 1 cm broad, more acute; inner segments to 1.3 cm long, more rounded at apex; nectaries triangular; stamens about half the length of perianth; filaments slender, slightly dilated below, much longer than anthers; style exceeding the stamens, 3-fid to 1/3; capsule 1.5 cm long, 1.3 cm in diameter, rounded at base, obtuse at top, the irregular ribs dilated upward. May.

Woods and slopes in the subalpine zone.— E. Siberia: Dau., Ang.-Say., Yen. (SE). Endemic. Described from Transbaikalia (Urgudei). Type in Leningrad.

* [The term apparently corresponds to "rice-grain" bulblets.]

320 26. F. Maximowiczii Freyn, Pl. Karonae in Ö. B. Z. (1901) 36. — F. dagana Maxim. Prim. Fl. Amur. (1859) 279, non Turcz.

Perennial; bulb less than 1 cm across, of several scales; stem 20–35 cm long, slender, glabrous, smooth, leafless below, with a single leaf whorl at upper third and occasionally a small solitary leaf between the whorl and flower; leaves 4 or 5 in whorl, linear-lanceolate to linear, subobtuse, glaucescent beneath, dark green above, 6–8 cm long, 3–10 mm broad; floral leaf solitary; flowers solitary (sometimes 2); pedicel short, erect; perianth broadly open-campanulate, outside purplish-violet, glaucescent; inner surface reddish, finely checkered with translucent yellow; perianth segments to 5 cm long and to 14 mm broad, oblong-elliptic, tapering at both ends, terminating in a narrow obtuse tip, the margin yellow, beset with short hairs; nectaries on lower third of segments, oval; stamens about half the length of perianth; filaments slender, several times as long as anthers; stigma deeply lobed; capsule ovaloid, obtusish, narrowed toward base, ca. 2 cm long, rather broadly winged. June. (Plate XIX, Figure 2).

Larch and birch woods and slopes. — E. Siberia: Dauria; Far East: Uss., Ze.-Bu., Uda. Endemic. Described from Zeya landing-stage.

Genus 272. **TULIPA*** L.**

L. Gen. pl. (1753) 145.

Perianth segments 6, deciduous, destitute of nectaries; stamens 6, shorter than perianth, equal or the inner somewhat longer; anthers basifixed; ovary many-ovuled, with sessile stigma or with more or less developed style; seeds flat. Perennial bulbose plants, with cauline leaves and (in the USSR) heliophilous [heliotropic?] flowers.

Economic importance. In addition to being accepted as widely distributed commercial ornamentals, tulips are also the object of specialized collections. Hence, in spite of the availability of numerous cultivated varieties and the horticultural introduction of wild species, there is a continuous pursuit of ever new tulips. It may be noted that fanciers do not disdain species with small insignificant flowers which, by accepted standards, are not ornamental.

Thus, all the tulips may be considered to some extent as an export
321 article. Horticultural firms of international standing, whose catalogs have long been adorned with the names of our wild tulips, maintain a continuous demand. Many tulips are very difficult to propagate in the West and, since the species are in most instances restrictedly endemic, they can be obtained only in the Soviet Union. Provided that proper arrangements are made to ensure that the foreign consumers become acquainted with the entire range of our tulips, the export of tulip bulbs may turn into a significant item of foreign trade.

Tulips must not be neglected in our urban planting programs. It should be remembered that the most robust and large-flowered tulips (Tulipa Fosteriana, T. ingens, T. Schmidtii, T. Eichleri, T. Micheliana, T. Tubergeniana, T. lanata, T. Greigii,

* Name derived by corruption from dulbend, the Persian word for turban.

** Arranged by A.I. Vvedenskii.

T. Hoogiana, T. kuschkensis) grow wild on USSR territory and all that is needed is to organize the supply of their bulbs.

Local inhabitants often use raw tulip bulbs for food.

Note. Study of the genus Tulipa is beset with exceptionally great obstacles. One of the serious difficulties consists in the fact that it is almost impossible to make use of herbarium material in the study of Tulipa species. On top of that, the species are polymorphic and they vary to such an extent in respect of such characters as the color and shape of perianth segments or the presence of basal blotch and colored margin, that it is often most difficult to relate a deviating specimen to a given species even through found as a population component of that species. Characters of more stable nature are the consistence and vesture* of the bulb tunics as well as the shape of flower and bud. The last two characters are virtually undiscernable in the herbarium.

Another obstacle in the study of tulips is the absence of precise records of origin for various species, since many tulips were described in horticultural establishments where provenance data were not given due attention or were possibly concealed.

Because of the incomplete knowledge of many species, the systematics of tulips is very imperfect. The now accept system of Baker and Boissier** is highly artificial, but it would be difficult to attempt its revision in view of the scarcity of our information concerning the tulip flora of Hither Asia. It has only been possible to establish two new monotypic sections for two severely isolated Central Asian tulips and to transfer T. sogdiana from the section Leiostemones to the section Eriostemones. This species, in having naked filaments, has so far been detached from related forms.

When collecting tulips, it is necessary to note in detail the color of all flower parts and to cut the bulb lengthwise. The latter procedure ensures better drying of the plant and facilitates the study of bulb tunics. It is very important to dig up and to dry sterile specimens, noting the possible presence of an underground shoot. As already mentioned, an important character is provided by the direction of the bud before expansion so that, whenever possible, fixation of this character should be secured.

1.† Filaments naked . . . . . 2.
+ Filaments hairy or bearded at base . . . . . 49.
322 2. Style obsolete or obsolescent . . . . . 3.
+ Style distinct, the length of ovary . . . . . 47.
3. Anthers opening gradually and very slowly from top to base and becoming contorted . . . . . 43. T. Kaufmanniana Rgl.
+ Anthers opening rapidly, not becoming contorted . . . . . 4.
4. Anthers several times the length of filaments; perianth segments 20–30 mm long, pale yellow, acute, the outer pubescent. . . . . 42. T. Krauseana Rgl.
+ Anthers shorter to not more than 3 times the length of filaments; plants differing in other characters . . . . . 5.
5. Bulb tunics strongly produced (up to soil level), their inner face hairy-lanuginose throughout . . . . . 6.
+ Bulb tunics not produced or only slightly produced, and if strongly so appressed-hairy or arachnoid-villous only at summit and naked below. . . . . 8.
6. Upper leaves surpassing or at least reaching the lower; aerial part of the plant one-half to two-thirds as long as the underground part; perianth segments rather gradually acuminate, with a dark violet blotch on both faces . . . . . 23. T. Borszczowii Rgl.
+ Upper leaves not surpassing the flower; aerial part slightly shorter than the underground part; perianth segments rather abruptly acuminate . . . . . 7.
7. Perianth segments without a basal blotch . . . . . 22. T. Behmiana Rgl.

* Vesture must be observed on the younger (inner) bulb tunics.

** Baker in Journ. Bot. 14(1874) 276–277; Boissier Fl. Or. V (1884) 191.

† For identification with the aid of this key, it is desirable to have live plants in addition to herbarium material.

+ Perianth segments commonly with a blackish-violet basal blotch on the inner face, rarely on both faces . . . . 21. T. Lehmanniana Merckl.

8. Leaves 2 (3); perianth segments 15–25–(30) mm long, white, yellow at base, becoming faintly rose after anthesis, the outer dingy violet on the outside, the inner abruptly narrowed into a claw; small, glabrous desert plants; bulb tunics firm, coriaceous, lanose on inner face. . . . . 48. T. sogdiana Merckl.

+ Leaves 3 to several; large plants with bright flowers or small mountain plants, differing in their characters . . . . . 9.

9. Bulb tunics profusely arachnoid-villous all over the inner face. . . . 10.

+ Bulb tunics glabrate or pilose or lanate, always with straight hairs, or, if arachnoid-villous, then tunics hairy only at summit . . . . . 13.

10. Outer perianth segments acutish, slightly longer than obtuse inner segments . . . . . 4. T. Julia C. Koch.

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+ Perianth segments subequal, acute . . . . . 11.

11. Perianth segments raspberry-red; stem and flower glabrous. . . . . 3. T. Hoogiana B. Fedtsch.

+ Perianth segments red . . . . . 12.

12. Perianth segments abruptly short-acuminate, commonly with an emarginate blotch; peduncle usually glabrous, rarely pubescent. . . . . 2. T. kuschkensis B. Fedtsch.

+ Perianth segments rather gradually long-acuminate, commonly with an acute blotch; peduncle pubescent. . . . . 1. T. Tubergeniana Hoog.

13. Robust plants, 40–50 cm tall; leaves 6–12, evenly distributed, the lower narrowly lanceolate, the upper sublinear . . . . . 17. T. Schmidtii Fom.

+ Leaves 3 or 4, broader, or numerous and narrow and then the plants small, 10–30 cm tall . . . . . 14.

14. Stems in upper part and peduncle pubescent . . . . . 15.

+ Stem and peduncle glabrous . . . . . 30.

15. Inner perianth segments shorter than the outer, concave, emarginate, connivent; leaves bright glaucous, approximate, rapidly diminishing in size up the stem, the lowest broadly oblong to subelliptic . . . . . 12. T. Albertii Rgl.

+ Inner perianth segments not concave, obtuse or acute . . . . . 16.

16. Bulb tunics on inner face lustrous, glabrous or with few hairs at summit; filaments red; perianth segments subequal. . . . . 17.

+ Bulb tunics pubescent all over or densely hairy at summit; filaments yellow, black or variegated; inner perianth segments different from the outer . . . . . 18.

17. Leaves (3) 4, spreading, not crisp; perianth segments orange-red, obtuse to acutish . . . . . 10. T. praestans Hoog.

+ Leaves 3 (the uppermost much reduced, often bractlike), spreading, crisp; perianth segments red, spreading acute . . . . . 11. T. subpraestans Vved.

18. Perianth segments yellowish or yellow, the outer flushed with violet on the outside . . . . . 19.

+ Perianth segments various shades of red or yellow or sometimes white, the outer not suffused with violet (see T. Greigii) . . . . . 22.

19. Bulb tunics coriaceous, with appressed hairs confined to the summit of inner face . . . . . 20.

+ Bulb tunics hairy all over . . . . . 21.

324 20. Lowest leaf sublorate to linear-lanceolate; bulb tunics subcoriaceous. . . . . 35. T. iliensis Rgl.

+ Lowest leaf lanceolate to oblong; bulb tunics firm, coriacerous. . . . . 36. T. ferganica Vved.

21. Perianth segments acuminate, the outer somewhat longer . . . . . 33. T. altaica Pall.

+ Perianth segments acute or acuminate, the outer scarcely shorter. . . . . 32. T. dubia Vved.

22. Bulb tunics slightly and thinly coriaceous, rather profusely lanate. . . . . 23.

+ Bulb tunics hairy or woolly . . . . . 24.

23. Leaves glaucous, slightly crisp; perianth segments with a black marginless blotch . . . . . 7. T. ingens Hoog.

+ Leaves glaucescent, crisp; perianth segments with a black yellow-margined blotch . . . . . 6. T. lanata Rgl.

24. Leaves slightly spreading, all distinctly carinate; perianth segments strongly spreading, acute; bulb tunics woolly . . . 9. T. carinata Vved.

+ Leaves more or less spreading, ecarinate; bulb tunics hairy or merely at summit woolly . . . . . 25.

25. Very robust plants; lowest leaf commonly broad, oblong or elliptic; flowers saucer-shaped; perianth segments commonly obtuse, minutely mucronulate, mostly with a 3-tipped black yellow-margined or yellow blotch. . . . . 8. T. Fosteriana Irv.

+ Lowest leaf lanceolate or oblong (or sometimes to broadly elliptic and then leaves violet-speckled); basal blotch not 3-tipped, and if 3-tipped then narrow and very long . . . . . 26.

26. Inner perianth segments slightly longer than the outer, connivent, the outer with reflexed tips; leaves violet-speckled . . . . . 27.

+ Inner perianth segments equal or the outer slightly longer . . . . . 28.

27. Perianth segments orange-red (sometimes yellow), at base yellow with a black blotch . . . . . 13. T. Greigii Rgl.

+ Perianth segments red, at base with a black yellow-margined or marginless blotch . . . . . 14. T. mogoltavica M. Pop. et Vved.

28. Perianth segments with a narrow long yellow-margined or marginless black blotch 1/3–1/2 the length of the segments; leaves violet-striped or without stripes . . . . . 15. T. Micheliana Hoog.

325 + Perianth segments with a short basal blotch occupying 1/5–1/4 its length. . . . . 29.

29. Perianth segments gradually long-acuminate, red, the black basal blotch margined with yellow, with a 3-toothed tip; ovary about the length of stamens . . . . . 16. T. Eichleri Rgl.

+ Perianth segments rather abruptly acuminate, very variable in color; ovary slightly shorter than stamens . . . . . 27. T. Schrenkii Rgl.

30. Perianth segments red or rose, rarely yellow or white (c.f. T. Schrenkii), the outer face not suffused with violet . . . . 31.

+ Perianth segments white, yellowish or yellow, rarely red, the outer suffused outside with dingy violet or reddish-violet, rarely without violet shades (c.f. T. Ostrovskiana, T. Kolpakovskiana and T. Zenaidae) . . . . . 38.

31. Bulb tunics very firm, coriaceous, the woolly or arachnoid-villous hairs confined to summit; leaves (3) 4–8, linear, the lowest sometimes linear-lanceolate . . . . . 32.
\+ Bulb tunics hairy or woolly all over or merely at summit . . . . . 34.
32. Bulb tunics arachnoid-shaggy at summit. . . . 20. T. Wilsoniana Hoog.
\+ Bulb tunics woolly at summit . . . . . 33.
33. Perianth segments rather abruptly acuminate, terminating in a long sharp point; leaves spreading, scattered, not crisp . . . . . 18. T. Maximowiczii Rgl.
\+ Perianth segments obtuse or rarely terminating in a very short point; leaves spreading, approximate, crisp . . . . . 19. T. linofolia Rgl.
34. Bulb tunics densely covered all over with woolly hairs . . . . . 5. T. Florenskyi Woron.
\+ Perianth segments hairy all over or merely at apex covered with woolly hairs . . . . . 35.
35. Bulb tunics weakly coriaceous, blackish-brown, more or less hairy all over. . . . . 27. T. Schrenkii Rgl.
\+ Bulb tunics black, coriaceous, densely hairy or woolly at summit, more or less oblong . . . . . 36.
36. Flowers rose. . . . . 26. T. rosea Vved.
\+ Flowers red (sometimes yellow) . . . . . 37.
37. Perianth segments (2) 3 (4 or 5) cm long, red; leaves mostly surpassing the flower; ovary greenish. . . . . 24. T. Korolkovii Rgl.
\+ Perianth segments (2.75) 4–6 cm long, bright red; leaves usually not surpassing the flower; ovary commonly rose . . . . 25. T. nitida Hoog.
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38. Filaments dilated from base, narrowed above to a point . . . . . 39.
\+ Filaments gradually narrowed from base or with nearly parallel margins (c.f. T. Korshinskyi). . . . . 42.
39. Bulb tunics subcoriaceous to subchartaceous; small plants . . . . . 39. T. tianschanica Rgl.
\+ Bulb tunics large, coriaceous; more vigorous plants . . . . . 40.
40. Leaves (3 or 4) 5 or 6 (7), very close together, all sublorate. . . . . 40. T. tetraphylla Rgl.
\+ Leaves 3 or 4, scattered, the lowest linear-lanceolate . . . . . 41.
41. Filaments strongly dilated, abruptly narrowed at summit . . . . . 31. T. brachystemon Rgl.
\+ Filaments gradually attenuate at summit . . . 32. T. platystemon Vved.
42. Small plants with approximate leaves. . . . . 43.
\+ Stronger plants with scattered leaves; bulb tunics firmly coriaceous. . . . . 45.
43. Leaves sublorate . . . . . 41. T. hissarica M. Pop. et Vved.
\+ Lowest leaf lanceolate to oblong-ovate, much larger than the upper leaves . . . . . 44.
44. Flowers yellow; filaments attenuate from base . . . . . 37. T. anisophylla Vved.
\+ Flowers white; filaments with nearly parallel margins, abruptly narrowed at summit . . . . . 38. T. Korshynskyi Vved.
45. Flower bud erect; lowest leaf elliptic to oblong or rarely lanceolate. . . . . 30. T. Zenaidae Vved.
\+ Flower bud drooping; lowest leaf linear-lanceolate to lanceolate . . . 46.

46. Perianth segments yellow, not blotched; leaves commonly surpassing the flower . . . . . 29. T. Kolpakovskiana Rgl.
+ Perianth segments red, with a black basal blotch; leaves not surpassing the flower . . . . . 29. T. Ostrovskiana Rgl.
47. Bulb tunics naked inside; leaves opposite; anthers oblong-elliptic, ca. 2.5 mm long . . . . . 63. T. heterophylla (Rgl.) Baker.
+ Bulb tunics with appressed hairs inside at summit; leaves alternate; anthers 3–6 mm long . . . . . 48.
48. Leaves subapproximate, commonly spreading; perianth segments obtuse or obtusish; filaments gradually attenuate from base . . . . . 62. T. uniflora (L.) Bess.
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+ Leaves much scattered, spreading; perianth segments very acute; filaments dilated below the middle . . . . . 61. T. heteropetala Ldb.
49. Leaf solitary, longitudinally crested on upper surface . . . . . 44. T. Regelii Krasn.
+ Leaves 2 to several, never crested . . . . . 50.
50. Perianth segments violet or pale rosy-violet . . . . . 51.
+ Perianth segments yellow or white, with a yellow basal spot, becoming tinged with rosy-violet only at fading . . . . . 52.
51. Perianth segments violet, 30–40 mm long, the outer slightly narrower than the inner; bulb tunics rigidly coriaceous . . . . . 44★. T. violacea Boiss. et Buhse.
+ Perianth segments pale rosy-violet, 20–35 mm long, the outer two-thirds as broad as the inner; bulb tunics papery . . . . . 45. T. caucasica Lipsky.
52. Bulb tunics naked or with few appressed hairs at summit; ovary with a fairly long style . . . . . 53.
+ Bulb tunics arachnoid-woolly all over or merely at summit lanate or appressed-hairy . . . . . 54.
53. Leaves 3–7, very close together, spreading; flowers 1–8; bulb tunics coriaceous, naked . . . . . 60. T. tarda Stapf.
+ Leaves 2, scattered, spreading; bulb tunics papery, naked or with few appressed hairs at summit . . . . . 59. T. dasystemon Rgl.
54. Bulb tunics rather densely appressed-hairy at summit. Anthers without cusp . . . . . 55.
+ Bulb tunics arachnoid-woolly all over, or merely at summit rather densely appressed-hairy. Anthers terminating in a short cusp; leaves commonly 2 . . . . . 57.
55. Perianth segments yellow, 40–55 mm long, the outer not tinged outside with violet; anthers the length of filaments, 8–13 mm long . . . . . 45★. T. silvestris T.
+ Perianth segments 20–35–(40) mm long; anthers one-third to one-half the length of filaments, 3–4 mm long . . . . . 56.
56. Perianth segments yellow, the outer often violet-tinged on the outside. . . . . 46. T. Biebersteiniana Schult.
+ Perianth segments white, yellow at base, the outer violet-tinged on the outside . . . . . 47. T. patens Agardh.
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57. Bulb tunics lanate inside at summit . . . . . 58.
+ Bulb tunics arachnoid-woolly over the whole inner face . . . . . 60.
58. Bulb tunics subcoriaceous; style fairly long, approximately the length of ovary . . . . . 58. T. dasystemonoides Vved.
+ Bulb tunics coriaceous; style shorter . . . . . 59.

59. Leaves much scattered, spreading, commonly much shorter than the flower . . . . . 49. **T. Buhseana** Boiss.
\+ Leaves less scattered, spreading, commonly surpassing the flower, perianth segments with relatively weak pubescence . . . . . 50. **T. turkestanica** Rgl.
60. Bulb tunics papery or nearly so . . . . . 61.
\+ Bulb tunics coriaceous . . . . . 62.
61. Leaves scattered; anthers 2–3 mm long; style short . . . . . 53. **T. biflora** Pall.
\+ Leaves very close together, subopposite; anthers 5–6 mm long; style long . . . . . 57. **T. orithyioides** Vved.
62. Perianth segments obtuse . . . . . 56. **T. Callieri** Hal. et Lev.
\+ Perianth segments acute or acutish . . . . . 63.
63. Bulb tunics densely arachnoid-woolly inside; perianth segments acute; anthers 4–6 mm long; leaves commonly not surpassing the flower . 64.
\+ Bulb tunics less hairy; perianth segments acutish; anthers 2–4 mm long; filaments naked above the ring of hairs; leaves slightly surpassing the flower . . . . . 65.
64. Leaves commonly spreading, much scattered; flower mostly solitary; inner perianth segments oblong-ovate, rather abruptly contracted into the claw . . . . . 51. **T. turcomanica** B. Fedtsch.
\+ Leaves spreading, less scattered; flowers mostly several; inner perianth segments oblong, rather gradually tapering into the claw . . . . . 52. **T. bifloriformis** Vved.
65. Outer perianth segments bearded at base, the inner broadly oblong, rather gradually tapering into the densely ciliate claw . . . . . 54. **T. polychroma** Stapf.
\+ Outer perianth segments naked at base, the inner oblong-ovate, rather abruptly tapering into the claw, this less ciliate at base; filaments less pubescent . . . . . 55. **T. koktebelica** Junge.

329 Section **TULIPANUM** Reb. in Giorn. bot. It. II (1851) 57. — Bulb tunics profusely arachnoid-shaggy over the whole inner surface; flowers large, bright-colored; filaments glabrous; ovary with a sessile stigma.

1. **T. Tubergeniana** Hoog. in Gard. Chron. XXXV (1904) 358, cum tabula.

Perennial; bulb ovoid, 3–5 cm thick; tunics brown, papery, profusely arachnoid-shaggy on inner surface; stem (5)–15–30 cm long, the upper part of stem and peduncle pubescent; leaves (3) 4, falcate, glaucescent, crisp, more or less pubescent, ciliate, surpassing the flower; lowest leaf lanceolate, (1.5)–2–4 cm broad; flower solitary; perianth segments red, 2.5–10 cm long, gradually acuminate to a pubescent point, the commonly acute black basal blotch margined with pale yellow-orange; outer segments rhomboidal or deltoid, slightly broader than the obovate or oboblong inner segments; stamens one-third the length of perianth; filaments naked, black; anthers violet, twice the length of filaments; ovary slightly shorter than stamens, commonly with a violet bloom; stigma sessile, much broader than ovary, usually purple. April.

Clayey slopes in mottled outcrop areas. — Centr. Asia: Pam.-Al. (SW). Endemic. Described from cultivated specimens originating from Bukhara; without precise indication of origin.

2. **T. kuschkensis** B. Fedtsch. in Bot. Jahrb. L. (1914) 612 (nomen nudum); Ej. in Fl. Turkm. 2 (1932) 302. — Ic.: Bot. Mag. (1934) tab. 9370.

Perennial; bulb ovoid, 3–5 cm thick; tunics brown, papery, profusely arachnoid-shaggy on inner surface; stem 20–50 cm long, glabrous or sometimes the peduncle pubescent; leaves (3) 4 (5), falcately recurved in upper part, scattered, glaucous, crisp, glabrous, ciliate-margined, commonly not surpassing the flower, successively decreasing in size up the stem, the lowest leaf lanceolate and 2–4 cm broad; flower solitary; perianth segments red, 4.5–9 cm long, abruptly short-acuminate to a pubescent point, the black basal blotch commonly narrowly emarginate and margined with pale yellow; outer segments oblong-rhomboidal or subobdeltoid, scarcely broader than the obtriangular or subobdeltoid-ovate inner segments; stamens one-third the length of perianth; filaments glabrous, black; anthers half as long again as the filaments, violet; ovary slightly shorter than stamens, greenish; stigma sessile, much broader than the ovary, yellowish; capsule cylindric, 3-angled, 1.5–3 cm broad, 3–6 cm long. April.

Clayey or rarely stony slopes. — Centr. Asia: Mtn. Turkm. (Kushkinskii River). Endemic. Described from Kushka. Type in Leningrad.

330 3. **T. Hoogiana** B. Fedtsch. in Gard. Chron. XLVIII (1910) 53, cum tabula. — T. amabilis B. Fedtsch. in Bot. Jahrb. L. (1914) 612 (nomen nudum). — T. ingens B. Fedtsch. in Fl. Turkm. (1932) 302, non Hoog. — Ic.: Fl. Turkm. 2 (1932) 301.

Perennial; bulb ovoid, 1.5–3–(4) cm thick; tunics blackish-brown or brown, papery, profusely arachnoid-shaggy on inner surface; stem 20–40 cm long, the stem and peduncle glabrous; leaves (3) 4,(5), spreading, scattered, slightly crisp, glaucous, glabrous, more or less ciliate, not exceeding or slightly exceeding the flower, progressively decreasing in size up the stem, the lowest lanceolate, 1.5–4 (8) cm broad; flower solitary; perianth segments raspberry-red, very rarely pinkish-orange or orange, 3.5–8 cm long; outer segments deltoid, gradually acuminate and terminating in a pubescent point, scarcely narrower than the obovate inner segments, these rather abruptly acuminate to a pubescent point; stamens one-third to one-half the length of perianth; filaments naked, black, red or yellow at base, white below anthers; anthers half as long again as filaments, yellow; ovary slightly shorter than stamens, commonly red at the top; stigma sessile, slightly broader than ovary, yellow; capsule 1.5–2 cm broad, 2–4 cm long. April-May.

Clayey or rarely gravelly slopes from the foothills to the steppe zone of mountains. — Centr. Asia: Mtn. Turkm. (Centr. and W. Kopet Dagh). Endemic. Described from cultivated specimens with unreliable indication of origin: "Bukhara".

4. **T. julia** C. Koch. in Linnaea XXII (1849) 225; Ldb. Fl. Ross. IV, 134. — T. montana var. Julia Baker in Journ. Bot. 14 (1874) 279 (p. p.); Boiss. Fl. Or. V, 193 (p. p.).

Perennial; bulb ovoid, 1.5–3 cm thick; tunics brown, papery, profusely arachnoid-shaggy on inside; stem 12–30 cm long, the stem and peduncle glabrous; leaves 4, slightly spreading, scattered, more or less crisp, glabrous, commonly ciliate-margined, not surpassing the flower,

progressively decreasing in size up the stem; lowest leaf lanceolate to oblong-lanceolate, 1–4 cm broad; flower solitary; perianth segments red, the dark basal blotch margined with yellow; outer segments 2.5–4.5 cm long, oblong-rhomboidal to oblong, acutish, terminating in a short pubescent point, slightly longer than the obovate to oblong-obovate obtuse inner segments; stamens about half the length of perianth; filaments naked, black; ovary slightly shorter than stamens, with sessile stigma. April-June.

Dry stony slopes. — Caucasus: S. Transc. Gen. distr.: Iran. Described from Shuragel. Type in Berlin.

331 Section **LEIOSTEMONES** Boiss. Fl. Or. V (1884) 191. — Bulb tunics nearly glabrous on the inside, or hairy at summit or all over, or profusely woolly, or merely at summit profusely arachnoid-shaggy; filaments naked; ovary with sessile stigma or with a style, this always shorter than ovary.

5. **T. Florenskyi** Woron. in Not. Syst. Herb. Horti Bot. Petrop. V (1924) 61. — T. montana var. Julia Baker in Journ. Bot. 14 (1874) 279 (p. p.); Boiss. Fl. Or. V (1884) 193 (p. p.).

Perennial; bulb ovoid, ca. 2 cm thick; tunics brown, subcoriaceous, densely woolly on the inside; stem 10–20 cm long, the stem and peduncle glabrous; leaves (3) 4, spreading subapproximate, glaucous, crisp, glabrous, commonly smooth-margined, not surpassing the flower, rather gradually decreasing in size up the stem; lowest leaf lanceolate, 1.5–2.5 cm broad; flower solitary; perianth segments red with a grayish-black yellow-margined basal blotch or yellow, 2.5–3.5 cm long; outer segments obovate-rhomboidal to oblong-rhomboidal, short-acuminate to a pubescent point; inner segments obovate-oblong, obtuse, slightly emarginate, sometimes short-pointed; stamens two-fifths the length of perianth; filaments naked, black, at base and below the anthers yellow; anthers yellow, scarcely shorter than filaments; ovary slightly shorter than filaments, with subsessile stigma; capsule ca. 1.5 cm thick, 3–4 cm long, short-beaked. April.

Dry stony slopes. — Caucasus: S. Transc.: Gen. distr.: Iran. Described from Sultanabad. Type in Leningrad.

6. **T. lanata** Rgl. in A.H.P. VIII (1884) 647, t. IV (p. p.).

Perennial; bulb ovoid, 2–4 cm thick; tunics thinly subcoriaceous, brown, profusely lanate on the inside; stem 40–60 cm long, the upper part of stem and peduncle pubescent; leaves 4, spreading, scattered, crisp, glaucescent, more or less pubescent, ciliate, not surpassing the flower, progressively decreasing in size up the stem; lowest leaf lanceolate, 3–6 cm broad; flower solitary; perianth segments red, 5–8 cm long, more or less acuminate to a pubescent point, the black obtuse or emarginate basal blotch margined with pale yellow; outer segments rhomboidal to oblong-rhomboidal, slightly broader than the oblong-obovate inner segments; stamens one-third to two-fifths the length of perianth; filaments naked, black; anthers commonly yellow, twice the length of filaments; ovary slightly shorter than stamens, with sessile stigma; capsule 2 cm broad, 5 cm long. April-May.

Clayey or rarely stony slopes in the lower mountain zone. — Centr. Asia: Pam.-Al. (Surkhan and Kafirnigan river basins). Endemic. Described from Khodzha-balkata. Type in Leningrad.

332 7. **T. ingens** Hoog in Gard. Chron. XXXII (1902) 14, f. 7.

Perennial; bulb ovoid, 2–3–(4) cm thick; tunics blackish-brown or brown, thinly subcoriaceous, rather profusely lanate on the inside; stem 15–35 cm long, the upper part of stem and peduncle pubescent; leaves 3–(5), spreading, scattered, slightly crisp, glaucous, pubescent, more or less ciliate-margined, progressively decreasing in size up the stem, not surpassing the flower; lowest leaf lanceolate, 2–5–(9) cm broad; flower solitary; perianth segments red, 4–11 cm long, more or less acuminate to a pubescent point, the black obtuse or emarginate blotch not margined; outer segments oblong-rhomboidal, slightly broader than the oboblong to oboblong-elliptic inner segments; stamens one-third to two-fifths the length of perianth; filaments naked, black; anthers commonly violet, twice the length of anthers; ovary slightly shorter than stamens, with sessile stigma; capsule ca. 2 cm broad, 3–6 cm long. April-May.

Clayey slopes, up to 2500 m. — Centr. Asia: Pam.-Al. (Central Zeravshan, Kashka-darya River basin and south to Kugitang). Endemic. Described from "Bukhara", without any more precise indication of origin.

8. **T. Fosteriana** Irv. in Gard. Chron. XXXIX (1906) 322, f. 130.

Perianth; bulb ovoid, 2–5 cm thick; tunics blackish-brown, coriaceous, densely hairy on the inside especially at summit; stem 15–35 cm long, the upper part of stem and peduncle pubescent; leaves 3 or 4, spreading, scattered, slightly crisp, glaucous or green, pubescent, ciliate, not surpassing the flower, rapidly decreasing in size up the stem; lowest leaf oblong to elliptic, 3–15 cm broad; flower solitary, saucer-shaped; perianth segments red, 4.5–12.5 cm long, commonly obtuse with a very short pubescent point, the 3-pointed basal blotch black margined with yellow or yellow throughout; outer segments oblong-elliptic to oboblong; inner segments obovate to oboblong; stamens one-third to two-fifths the length of perianth; filaments naked, black; anthers violet, half as long again as filaments; ovary slightly shorter than anthers, with sessile stigma; capsule 2.5–3 cm broad, 5–7 cm long. April-May.

Fine-textured slopes and rock benches. — Centr. Asia: Pam.-Al. (Samarkand mountains). Endemic. Described from "Bukhara" from cultivated specimens, without precise indication of origin.

9. **T. carinata** Vved. in Herb. Fl. As. Med. (1935) No. 579.

Perennial; bulb ovoid, 2–3 cm thick; tunics blackish-brown, coriaceous, woolly on the inside; stem 20–55 cm long, the upper part of stem and peduncle woolly; leaves (3) 4, slightly spreading to suberect, scattered,
333 glaucescent-green, not crisp, carinate, pubescent, ciliate, not surpassing the flower, progressively decreasing in size up the stem; lowest leaf lanceolate, 1.5–3 cm broad; flower solitary; perianth segments red, mostly gradually very long-acuminate to a pubescent cusp, 4–8 cm long, the obtuse or acute or sometimes 3-pointed basal blotch black or yellow or black margined with yellow; outer segments oblong-lanceolate to oboblong; inner segments oboblong-lanceolate to oboblong; stamens one-third the length of perianth; filaments naked, black or blackish; anthers yellow or violet, slightly longer than filaments; ovary slightly shorter than stamens, with sessile stigma. May-June.

Stony slopes in the middle and upper mountain zone. — Centr. Asia: Pam.-Al. (Chul'bair, Khodma-gurgur-ata). Endemic. Described from Khodma-barku. Type in Tashkent.

Note. The closely interrelated species of W. Pamirs T. lanata, T. ingens, T. Fosteriana, and T. carinata, together with three apparently new species — Chash (Lipsky), Khanaka (Aniskhov) and vicinity of Stalinabad [Dyushambe] (?) (Zapryagaev), Nura-tau (Popov, Bochantsev), deserve further study on live material.

10. **T. praestans** Hoog. in Gard Chron. XXIII (1903) 364, f. 126.— T. suaveolens Rgl. in A.H.P. VIII (1884) 650 (exclus. var. bicolor), non Roth. Cat. I, 1797.—Ic.: Bot. Mag. LIX (1903) t. 7920.

Perennial; bulb ovoid, 2–3 cm thick; tunics thick, coriaceous, blackish-brown, glabrate on the inside; stem 15–40 (75) cm long, the upper part of stem and peduncles pubescent; leaves (3) 4, spreading, scattered, glaucescent, not crisp, pubescent, ciliate, carinate, rather gradually decreasing in size up the stem, not surpassing the flowers; flowers 1 or 2; perianth segments orange-red, 3.5–7 cm long, oblong-obovate, commonly obtuse, rarely acutish, subequal; stamens two-fifths the length of perianth; filaments naked, red; anthers yellow or violet, half as long again to twice as long as filaments; ovary slightly shorter than stamens, suffused with violet; stigma subsessile; capsule 1½–2 cm thick, 3–4 cm long April-June.

Stony or clayey slopes in the middle mountain zone.— Centr. Asia: Pam.-Al. (SE). Endemic. Described from E. Tadzhikistan.

Note. Regel' (A.H.P. X (1887) 366) gave a description based on cultivated specimens of the species T. Boettgeri from the vicinity of Kangurt. No samples have remained in the herbarium. Considering the provenance, it might be assumed that Regel' was dealing with orange-colored T. praestans, but certain characters included in the description contradict such an assumption. The author presents a translation of the original description.

334 Bulbs ovoid; inner surface of tunics covered at apex with appressed hairs; stem glabrous, leafy above the middle, to 40 cm long; leaves 4, with hairy cartilaginous margin, very often crisp, glabrous on both sides; lowest leaf elliptic-lanceolate; upper leaves shorter and narrower, lanceolate or the uppermost linear-lanceolate; perianth segments obovate, round-tipped, mucronate, orange, without a basal blotch, glabrous, the outer to 6 cm long, the inner slightly shorter; filaments linear-lanceolate, purple, 6–7 mm long, naked; anthers linear-lanceolate, 15–17 mm long; stigma broader than ovary.

11. **T. subpraestans** Vved. in Herb. Fl. As. Med. (1935) No. 597.

Perennial; bulb ovoid, 1.5–2 cm thick; tunics coriaceous, blackish-brown, lustrous glabrate on the inside; stem 15–30 cm long, the upper part of stem and peduncle more or less pubescent; leaves 3 (the uppermost much reduced and often bractlike), spreading, glaucous, crisp, pubescent, not surpassing the flower; flower solitary; perianth segments red, without a basal blotch, 3–5 cm long, oblong, widely spreading, subequal; stamens two-fifths the length of perianth; filaments naked, red; anthers yellow; ovary slightly shorter than stamens, with subsessile stigma. April-May.

Stony and clayey slopes in the middle mountain zone.— Centr. Asia: Pam.-Al. (Sebistak, Sarsaryak). Endemic. Described from Tut-kaul. Type in Tashkent.

12. **T. Alberti** Rgl. in A. H. P. V (1877) 264. — Ic.: Rev. Hort. (1881) 430.

Perennial; bulb ovoid, 2–3 cm thick; tunics coriaceous, blackish-brown, oblong, hairy on the inside, more densely so at summit; stem 12–20 cm long, stocky, the upper part of stem and peduncle pubescent; leaves 3 (4), spreading, approximate, intensely glaucous, pubescent, more or less ciliate-margined, crisp, rapidly decreasing in size up the stem, often surpassing the flower; lowest leaf broadly oblong to subelliptic, 3–7 cm broad; flowers solitary; perianth segments red or raspberry-colored or yellow, at base yellow with a black blotch; outer segments 3.5–6 cm long, slightly longer than inner, pubescent outside, rather abruptly acuminate to a pubescent point, rhomboidal or oboblong, tapering at apex; inner segments triangular-obovate, cuneate at base, concave, emarginate, connivent; stamens one-third to one-half the length of perianth; filaments naked, yellow; anthers yellow, slightly longer than filaments; ovary slightly longer than filaments; greenish, with sessile stigma; capsule 2–2.5 cm broad and 3–5 cm long. April.

335 Gravelly slopes. — Centr. Asia: Balkh. (Targyl, Kuyankuz), T. Sh. (Kara-tau, Chu-Ili Mountains). Endemic. Described from Tashkent Ala Tau. Type in Leningrad.

Note. Fertile specimens (in a very poor state of preservation) from the lower reaches of the Sary-su River apparently belong to this species.

13. **T. Greigii** Rgl. in A. H. P. II (1873) 449; Boiss. Fl. Or. V 196 (p. p.). — T. altaica var. karatavica Rgl. in Bull. Soc. Nat. Mosc. XLI, 1 (1868) 439. — Ic.: Rgl. in Gartenfl. XXII (1873) t. 773.

Perennial; bulb ovoid, 2.5–4 cm thick; tunics coriaceous, blackish-brown, the inner surface densely hairy especially at summit; stem 20–40 cm long, the upper part of stem and peduncle pubescent; leaves (3) 4–6, approximate, spreading, crisp, glaucous, profusely violet-speckled on upper side, the upper more or less pubescent, ciliate, rapidly decreasing in size up the stem, commonly reaching the flower; lowest leaf oblong to broadly elliptic, 3.5–14 cm broad; flower solitary; perianth segments orange-red, sometimes yellow with a red central blotch, at base yellow with a black blotch, 3–10 cm long, rather abruptly cuspidate, the cusp pubescent; outer segments pubescent outside (especially on the back), ovate, spreading in upper part, slightly shorter than the obovate more or less connivent inner segments; stamens one-third the length of perianth; filaments naked, yellow or blackish; anthers yellow, rarely violet, twice the length of filaments; ovary slightly shorter than stamens, greenish, with sessile stigma; capsule 2–3 cm broad, 4–6 cm long. April-May.

Clayey slopes. — Centr. Asia: Ar.-Casp. (Kzyl-Orda), Syr D., T. Sh. Endemic. Described from Kara-tau mountains. Type in Leningrad.

Note. The plants from Syr Darya call for further study. They differ from the northern (typical), T. Greigii in their longer peduncles and the more gradual diminution of leaves up the stem.

14. **T. mogoltavica** M. Pop. et Vved. in Herb. Fl. As. Med. (1935) No. 594.

Perennial; bulb ovoid, 2–4 cm thick; tunics more or less produced, coriaceous, blackish-brown, hairy on the inside, more densely so at summit

and at base; stem 10–30 cm long, the upper part of stem and peduncle pubescent; leaves 4, subapproximate, spreading, crisp, glaucous, profusely violet-spotted on the upper side, more or less pubescent, ciliate, rather gradually decreasing in size up the stem, not surpassing the flower; lowest leaf oblong-lanceolate to broadly oblong, 2–7 cm broad; flower solitary; perianth segments red, 3–10 cm long, abruptly acuminate to a short pubescent cusp, the black basal blotch margined with yellow or not
336 margined; outer segments pubescent on the back, elliptic-rhomboidal, spreading in upper part, slightly shorter than the triangular-obovate more or less connivent inner segments; stamens two-fifths the length of perianth; filaments naked, black; anthers blackish-violet, twice the length of filaments; ovary slightly shorter than stamens, greenish, with subsessile stigma; capsule ca. 2 cm broad, 3–4 cm long. April. (Plate XX, Figure 1 a, b).

Stony slopes. — Centr. Asia: T. Sh. (Mogol-tau). Endemic. Described from Mogol-tau mountains. Type in Tashkent.

15. **T. Micheliana** Hoog in Gard. Chron. XXXI (1902) 350, f. 120. — T. Greigii Boiss. Fl. Or. V, 196 (p. p.).

Perennial; bulb ovoid, 2–4 cm thick; tunics coriaceous, blackish-brown, the inner surface hairy, more densely so at summit and at base; stem 15–40 cm long, the upper part of stem and peduncle pubescent; leaves 4 or 5, spreading, more or less scattered, glaucous, with violet often interrupted stripes on the upper side or without stripes, more or less pubescent, ciliate, crisp, gradually decreasing in size up the stem, mostly not surpassing the flower; lowest leaf linear-lanceolate to oblong, 2–6 cm broad; flower solitary; perianth segments red to raspberry-red, 2.5–10 cm long, rather abruptly acuminate to a pubescent cusp, the acute or 3-pointed black spot margined with yellow or rarely without a margin; outer segments slightly pubescent on the black, broadly rhomboidal to oblong-rhomboidal, rarely oblong-lanceolate; inner segments obtriangular or oboblong, rarely oblong-oblanceolate; stamens one-third to two-fifths the length of perianth segments; filaments naked, black, yellowish or red at base; anthers commonly violet, twice the length of filaments; ovary slightly shorter than stamens, green, with sessile stigma; capsule 1.5–2.5 cm broad, 3–6 cm long. April-May.

Stony or clayey slopes. — Centr. Asia: Mtn. Turkm., Pam.-Al. (NW). **Gen. distr.**: Iran. Described from the Transcaspian area. The description based on cultivated specimens does not provide a precise indication of origin.

16. **T. Eichleri** Rgl. in Gartenfl. XXIII (1874) 193, t. 799; Boiss. Fl. Or. V, 194. — Ic.: Rgl. l. c. — Exs.: Herb. Fl. cauc. No. 58; Fl. cauc. exs. No. 128; Pl. or. exs. No. 354.

Perennial; bulb ovoid, 2–3 cm thick; tunics coriaceous, blackish-brown, suboblong, hairy on the inside, especially at summit and at
339 base; stem 20–40 cm long, the upper part of stem and peduncle pubescent; leaves 3 (4), more or less spreading, scattered, more or less (the upper ones) pubescent, ciliate, glaucous, crisp, progressively decreasing in size up the stem, not surpassing the flower; lowest leaf linear-lanceolate to oblong, 1–6 cm broad; flower solitary; perianth

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Plate XX

1. Tulipa mogoltavica M. Pop. et Vved.: 1a) outer perianth segment; 1b) inner perianth segment.– 2. T. sogdiana Merckl.: 2a) outer perianth segment; 2b) inner segment perianth; 2c) style; 2d) stamen.

segments red, 2.5–7 cm long, rather gradually acuminate to a pubescent cusp, the rather small rhomboidally 3-pointed black basal blotch margined with yellow; outer segments oblong to oblong-lanceolate; inner segments oblong-oblanceolate; stamens two-fifths to one-half the length of perianth; filaments naked, black, sometimes yellow at base; anthers yellow or violet, twice the length of filaments; ovary about the length of stamens, with sessile stigma. April-May.

Dry slopes and among field crops. — Caucasus: E. Transc. Gen. distr.: Iran (?). Described from Shemakha. Type in Leningrad.

17. **T. Schmidtii** Fom. in Monit. Jard. Bot. Tiflis. 14 (1909) 47. — Ic.: Miscz. in Tr. Byuro prikl. bot. V (1912) t. XLII. — Exs.: Herb. Fl. cauc. No. 18, 59.

Perennial; bulb ovoid, 2.5–5 cm thick; tunics subcoriaceous, brown, woolly on the inside; stems 40–50 cm long, the stem and peduncle glabrous; leaves 6–12, reclinate or slightly spreading, more or less scattered, carinate, glaucous, glabrous, ciliate-margined, not surpassing or slightly surpassing the flower; lowest leaf narrowly lanceolate, 2–4.5 cm broad; flower solitary; perianth segments red, the rhomboid subacute black basal blotch margined with yellow; outer segments 5–10 cm long, slightly longer than the inner, deltoid, gradually acuminate to a slightly pubescent point; inner segments obovate-deltoid, rather abruptly acuminate to a short point; stamens one-third to one-half the length of perianth; filaments naked, black; anthers yellow, about as long as filaments; ovary slightly shorter than stamens, red at the top, with sessile stigma; capsule 2–2.5 cm broad, 6–7 mm long. May.

Slopes and among field crops. — Caucasus: S. Transc., Tal. Endemic (?), Described from Talysh: Eshakcha. Type in Leningrad.

18. **T. Maximowiczii** Rgl. in A. H. P. X (1889) 687. — ? T. Batalini Rgl. in A. H. P. X (1889) 688. — Ic.: Rgl. in Gartenfl. XXXVIII (1889) t. 1307. —

Perennial; bulb ovoid, 1–2 cm thick; tunics black, coriaceous, firm, the inner surface woolly at summit; stem 15–30 cm long, the stem and peduncle glabrous; leaves (4) 5–8, spreading, scattered, not crisp, glaucous, narrowly purple-margined, more or less ciliate, linear, gradually decreasing in size up the stem, commonly surpassing the flower; lowest leaf 5–10 mm broad; flower solitary; perianth segments red, rather
340 abruptly acuminate to a fairly long point, the bluish-black truncate or obtusely 3-pointed blotch margined on the sides with white; outer segments rhomboidal-oblong or oboblong; inner segments oboblong to oblong-obovate; stamens half the length of perianth; filaments naked, black; anthers violet, two-thirds the length of filaments; ovary slightly shorter than perianth, with violet-tinged ribs and a very short style. April.

Mottled outcrops (always ?). — Centr. Asia: Pam.-Al. (Vakhsh, Kizyl-su). Endemic. Described from Bukhara, without precise indication of origin. Type in Leningrad.

Note. T. Maximowiczii and T. linifolia are very closely related and supplementary observations on live material are needed for definite distinction.

19. T. linifolia Rgl. in A.H.P. VIII (1884) 648, t. V, f. 1-2a-e (p. p.). — Ic.: Rgl. in Gartenfl. XXXV (1886) t. 1235.

Perennial; bulb ovoid, 1-2 cm thick; tunics black, coriaceous, firm, the inner surface woolly at summit; stem 10-20 cm long, the stem and peduncle glabrous; leaves (3)-6-8, spreading, approximate, crisp, usually not surpassing the flower; lowest leaf 4-6 mm broad; flower solitary; perianth segments red, 2-4 cm long, obtuse, rarely with a very short point, the outer rhomboidal-lanceolate to rhomboid-oblong; inner segments oboblong to oboblong-ovate; stamens half the length of perianth; filaments naked, black; anthers yellow, one-half to two-thirds the length of filaments; ovary slightly shorter than stamens, with very short stigma. April-June.

Stony slopes. — Centr. Asia: Pam.-Al. (Pyandzh). Endemic. Described from Kala-i-khum. Type in Leningrad.

20. T. Wilsoniana Hoog in Gard. Chron. XXXII (1902) 50. — Ic.: Hoog in Gard. Chron. XXIX (1901) f. 121.

Perennial; bulb ovoid, 1.5-2 cm thick; tunics blackish-brown, coriaceous, with a mass of protruding arachnoid-shaggy hairs at summit; stem 10-20 cm long, the stem and peduncle glabrous; leaves 4 or 5, spreading, approximate, glaucous, crisp, glabrous, narrowly purple-margined, more or less ciliate, progressively decreasing in size up the stem, surpassing the flower; lowest leaf narrowly linear-lanceolate, 6-20 mm broad; flower solitary; perianth segments bright red, 2-5 cm long, obtusish, the small black basal blotch not margined; outer segments oblong-rhomboidal to oblong; inner segments oblong-obovate; stamens one-third the length of perianth; filaments naked, black below, red above; anthers yellow, two-thirds the length of filaments; ovary slightly shorter
341 than stamens, greenish, with subsessile stigma; capsule ca. 1.5 cm broad, (1.5)-2-3 cm long. May-June.

Stony slopes in the steppe mountain zone. — Centr. Asia: Mtn. Turkm. Endemic. Described from Kopet Dagh.

21. T. Lehmanniana Merckl. in Mém. Acad. Petérsb. Sav. étr. VII (1854) 513.

Perennial; bulb ovoid, 1.5-4 cm thick; tunics very firmly coriaceous, blackish-brown, strongly produced (up to soil surface), profusely covered on the inside with woolly (sometimes slightly crisp) hairs; stem 20-50 cm long, the aerial part as long as or longer than the underground part, the stem and peduncle glabrous; leaves 4, declined or more or less spreading, scattered, glaucous, crisp, glabrous, smooth-margined, rather rapidly decreasing in size up the stem, usually markedly shorter than lower; lowest leaf lanceolate to linear-lanceolate, 1.5-2.5 cm broad; flower solitary; perianth segments yellow, orange or red, 2.5-7 cm long, usually acuminate to a short slightly pubescent point, the dark violet or blackish-violet basal blotch commonly confined to the inner face; outer segments obovate to oblong-rhomboidal; inner segments triangular-oblanceolate to triangular-obovate; stamens one-third the length of perianth; filaments naked, yellow or the upper part blackish-violet; anthers yellow, as long as filaments; ovary slightly shorter than stamens, with sessile stigma; capsule 1-1.5 cm in diameter, 2.5-3 cm long. April.

Sandy hammadas and mottled outcrops. — Centr. Asia: Kyz. K., Mtn. Turkm., Syr D., Amu D. Gen. distr.: Iran. (N. Afghanistan). Described from area between Bukhara and Kermin. Type in Leningrad.

22. **T. Behmiana** Rgl. in A.H.P. VI (1880) 505.

Perennial; bulb ovoid, 2–3 cm thick; tunics very firm, coriaceous, blackish-brown, strongly produced (up to soil surface), commonly lanate on the inside; stem 15–40 cm long, the aerial part slightly shorter than the underground part, the stem and peduncle glabrous; leaves 4, spreading, scattered, glaucous, very crisp, glabrous, smooth-margined, rather rapidly decreasing in size up the stem, not surpassing the flower; lowest leaf lanceolate, 2–3 cm broad; flower solitary, nodding in bud; perianth segments yellow or red, without a basal blotch, 2.5–6 cm long, usually abruptly acuminate to a slightly pubescent point; outer segments oblong-rhomboidal or triangular-obovate; inner segments obovate to triangular-obovate; stamens one-third to two-fifths the length of perianth; filaments naked, yellow or the upper part oblong [sic]; anthers yellow or rarely violet, scarcely shorter than filaments; capsule ca. 2 cm in diameter, 3–5 cm long. April-May.

342 Sand and sand-and-stone deserts. — Centr. Asia: Balkh. Endemic. Described from Iliisk. Type in Leningrad.

23. **T. Borszczowii** Rgl. in Bull. Soc. Nat. Mosc. XLI, 1 (1868) 438. — T. aurata Litv. in Izv. Turk. geogr. o-va IV, 5 (1905) 35. — Ic.: Gartenfl. XXXIII (1884) t. 1175 g–k. — Exs.: HFR No. 2448.

Perennial; bulb ovoid, 2–4 cm thick; tunics very firm, coriaceous, blackish-brown, strongly produced (up to soil surface), profusely lanate on the inside; stem 20–40 cm long, the upper part one-half to two-thirds as long as the underground part, the stem and peduncle glabrous; leaves 4, spreading, glaucous, very crisp, glabrous, smooth-margined, rather rapidly decreasing in size up the stem, surpassing or at least reaching the flower; lowest leaf lanceolate to oblong-lanceolate, $1\frac{1}{2}$–$4\frac{1}{2}$ cm broad; flower solitary, erect in bud; perianth segments yellow, orange or orange-red, 3–6 cm long, usually gradually acuminate to a slightly pubescent point; outer segments rhomboidal; inner segments obdeltoid to triangular-obovate; stamens one-third to two-fifths the length of perianth; filaments naked, dark violet; anthers dark violet, as long as filaments; ovary slightly shorter than stamens, with sessile stigma; capsule 1.5–2 cm in diameter, 2.5–4.5 cm long. May.

Sand and sandy clay deserts. — Centr. Asia: Ar.-Casp., Kyz. K (N.). Endemic. Described from parts of Kara Kum deserts near Aral Sea. Type in Leningrad.

24. **T. Korolkovii** Rgl. in A.H.P. III (1875) 295. — Ic.: Rgl. Fl. turk. (1876) t. XXII, f. 6–7.

Perennial; bulb ovoid, 1–2 (3) cm thick; tunics firm, coriaceous, black, produced (sometimes considerably), woolly on the inside; stem 10–20 cm long, the stem and peduncle glabrous; leaves 3, spreading, more or less scattered, crisp, glaucous, progressively decreasing in size up the stem, commonly surpassing the flower; lowest leaf linear-lanceolate, 0.5–1 cm broad; flower solitary; perianth segments red, sometimes yellow

or mottled, (2)–3–(4.5) cm long, with a small usually truncate blotch on inner face, commonly obtuse, sometimes with a very short pubescent point; outer segments rhomboidal or obovate; inner segments obovate to triangular-obovate; stamens two-fifths the length of perianth; filaments black, often yellowish-below; anthers yellow, one-half to two-thirds as long as filaments; ovary greenish, with subsessile stigma. March-April.

Sandy or gravelly slopes in the foothills. — Centr. Asia: Syr D. Endemic. Described from Paris. Type in Leningrad.

343 25. **T. nitida** Hoog in Gard. Chron. XXXI (1902) 350, f. 119.

Perennial; bulb ovoid, $1\frac{1}{2}$–$2\frac{1}{2}$ cm thick; tunics firm, coriaceous, black, produced (sometimes considerably), the inner surface woolly at summit; stem 10–20–(30) mm long, the stem and peduncle glabrous; leaves 3, spreading, more or less scattered, very crisp, glaucous, progressively decreasing in size up the stem, commonly not surpassing the flower; lowest leaf linear-lanceolate, 0.75–1.5 cm broad; flower solitary, nodding in bud; perianth segments bright red, (2.75)–4–6 cm long, commonly obtuse, often with a very short pubescent point, the small basal blotch on the inner face usually 3-pointed; outer segments deltoid to broadly oblong-rhomboidal; inner segments obovate to triangular-obovate; stamens one-third the length of perianth; filaments black or rose; anthers yellow, as long as or longer than filaments; ovary commonly rose-colored, with a short style; capsule ca 1.5 cm in diameter, 2.5–3 cm long, short-beaked. April.

Stony and gravelly slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Bukhara; the description based on cultivated specimens without precise indication of origin.

Note. The characteristics distinguishing this species from T. Korolkovii are not clear at present and specimens from the N. parts of Pam.-Al. can be referred with equal justification to either species.

26. **T. rosea** Vved. in Herb. Fl. As. Med. (1935) No. 596.

Perennial; bulb ovoid, 1.5–2 cm thick; tunics firm, coriaceous, black, the inner surface with protruding woolly hairs; stem 7–20 cm long, the stem and peduncle glabrous; leaves 3, more or less scattered, spreading, crisp, glaucous, progressively decreasing in size up the stem, commonly surpassing the flower; lowest leaf linear-lanceolate, 1–1.5 cm broad, flower solitary; perianth segments rose, 2.5–4 cm long, obtuse or sometimes with a very short point, the small basal blotch on inner face obtusely 3-pointed; outer segments elliptic-rhomboidal; inner segments obovate; stamens two-fifths the length of perianth; filaments naked, black, the upper part purple; anthers yellow, as long as filaments; ovary pale rose, slightly shorter than stamens, with a very short style; capsule (unripe) ca. 1 cm in diameter, 1.5 cm long, short-beaked. April.

Mottled outcrops. — Centr. Asia: Pam.-Al. (E. part of the foothills of Turkestan Range). Endemic. Described from Kim (Santo). Type in Tashkent.

27. **T. Schrenkii** Rgl. in A. H. P. II (1873) 452. — ? T. oxypetala Stev. in Bull. Soc. Nat. Mosc. XXX, 2 (1857) 81. — T. Gesneriana Ldb. Fl. Ross. IV, 134, non L.; Boiss. Fl. Or. V, 194; Shmal'g., Fl. II, 505. —
344 T. Gesneriana var. acutiflora Pacz. in Zap. Kiev. O-va Est. XI, I

(1890) 159. — T. monticola Wulff, Fl. Kryma I, 3 (1930) 41. — T. suaveolens auct. — Ic.: Ageenko, Obzor rast. Kryma (1897) t. 1. — Exs.: Doerfler Herb. Norm. No. 4181.

Perennial; bulb ovoid, 1.5–3 cm thick; tunics blackish-brown, slightly coriaceous, more or less hairy on the inside; stem 15–40 cm long, the stem and peduncle glabrous or more or less pubescent; leaves 3 (4), more or less spreading, scattered, glaucous, rather crisp, glabrous or pubescent, progressively decreasing in size up the stem, not surpassing the flower; lowest leaf linear-lanceolate to oblong, 1.5–6 cm broad; flower solitary; perianth segments red, yellow or white, 2.5–5.5 cm long, usually abruptly acuminate to a pubescent cusp, rarely obtuse, the basal blotch black or yellow or absent; outer segments oblong-rhomboidal to oblong; inner segments oblong-obovate to oboblong; stamens half the length of perianth; filaments naked, yellow or black; anthers slightly longer than to twice as long as filaments; ovary slightly shorter than stamens, with subsessile stigma; capsule 1–1.5 cm in diameter, 2–5 cm long. May.

Steppes, semideserts and deserts. — European part: Transc. (S.), Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., W. (N. part) and E. Transc.; W. Siberia: U. Tob., Irt. (W.); Centr. Asia: Ar.-Casp. (N.). Gen. distr.: Arm.-Kurd. Described from vicinity of Ishim. Type in Leningrad.

Note. The author has not seen the authentic T. oxypetala but, to judge by Wulff's description (op. c. 40), it does not apparently differ from T. Schrenkii, as the difference in the length of relationship of anthers and filaments — the character proposed by Wulff — is of no significance. Anthers twice the length of filaments also occur in T. Schrenkii. All the same, it cannot as yet be fully established that T. oxypetala and T. Schrenkii are in fact identical.

The author has not found any morphological differences between the yellow-flowered mountainous T. monticola and T. Schrenkii of the Crimean steppes.

28. T. **Ostrovskiana** Rgl. in A. H. P. VIII (1884) 659. — Ic.: Rgl. in Gartenfl. XXXIII (1884) t. 1144.

Perennial; bulb ovoid, 1.5–2 cm thick; tunics black, coriaceous, densely covered on the inside with appressed hairs; stem 15–40 cm long, the stem and peduncle glabrous; leaves 3, spreading, scattered, glaucous, crisp, glabrous, more or less ciliate, rather gradually decreasing in size up the stem, not surpassing the flower; lowest leaf linear-lanceolate to lanceolate, 1–4 cm broad; flower solitary, nodding in bud; perianth segments red, 3–8 cm long, acute, the black basal blotch margined with yellow; outer segments rhomboidal; inner segments oboblong; stamens one-third to two-fifths the length of perianth; filaments naked, attenuate
345 from base, yellow or blackish; anthers violet, twice the length of filaments; ovary slightly shorter than stamens, with subsessile stigma. May.

Clayey and gravelly clay slopes in the lower mountain zone. — Centr. Asia: T. Sh. (N.). Endemic. Described from Alma Ata.

29. **T. Kolpakovskiana** Rgl. in A. H. P. V (1877) 266. — T. triphylla auct. — Ic.: Rgl. in Gartenfl. XXVII (1878) t. 951.

Perennial; bulbs ovoid 1.5–2 cm thick; tunics black, coriaceous, the inner surface densely covered at summit with appressed hairs; stem

15–35 cm long, the stem and peduncle glabrous; leaves 3, more or less spreading, scattered, glaucous, crisp, glabrous, ciliate, gradually decreasing in size up the stem, commonly surpassing the flower; lowest leaf linear-lanceolate, 1–3 cm broad; flower solitary, nodding in bud; perianth segments yellow, 2.5–6 cm long, acute; outer segments more or less violet-tinged on the back, oblong to oblong-rhomboidal; inner segments oblong-oblanceolate to oboblong; stamens one-third to two-fifths the length of perianth; filaments naked, attenuate from base, yellow; anthers yellow, as long as filaments; ovary slightly shorter than stamens, with subsessile stigma. May.

Clayey and gravelly slopes in the foothills. — Centr. Asia: Dzu.-Tarb. (Dzungarian Ala Tau, S. part), T. Sh. (N.). Gen. distr.: Dzu.-Kash. Described from Alma Ata.

Note. Numerous hybrids between T. Kolpakovskiana and T. Ostrovskiana are known, as for instance from the Alma Ata area, that display various combinations in flower color and habit and thus completely obliterate the distinction between these species and render their determination difficult.

30. **T. Zenaidae** Vved. in Bull. Univers. As. Centr. 21 (1935) 150.

Perennial; bulb ovoid, 1.5–2.5 cm thick; tunics black or blackish-brown, coriaceous, the inner surface covered at summit with appressed hairs; stem 15–30 (40) cm long, the stem and peduncle glabrous; leaves 3, spreading, scattered, glaucous, not crisp, glabrous, ciliate- or rarely smooth-margined, rather rapidly decreasing in size up the stem, not surpassing the flower; lowest leaf oblong-lanceolate to oblong, 3–6 cm broad; flower solitary, erect in bud; perianth segments yellow (the outer reddish outside), orange or red, sometimes with a black or yellow basal blotch, 3–6.5 cm long, acuminate or acute; outer segments oblong-rhomboidal to oblong; inner segments oboblong; stamens two-fifths the length of perianth; filaments naked, attenuate from base, yellow or black; anthers yellow, scarcely longer than filaments; ovary green or violet tinged, slightly shorter than stamens, with sessile stigma. April-May.

346 Fine-textured and stony slopes in the lower mountain zone. — Centr. Asia: T. Sh. (Kirghiz Ala Tau). Endemic. Described from Shekule, Aleksandrovskii Range. Type in Tashkent.

31. **T. brachystemon** Rgl. in Gartenfl. XXI (1882) 323, t. 1099, f. 2, 3.

Perennial; bulb ovoid, ca. 2 cm thick; tunics blackish-brown, coriaceous, the inner surface covered at summit with appressed hairs; stem to 35 cm long, the stem and peduncle glabrous; leaves (3) 4, reclinate, spreading, glabrous or slightly ciliate, progressively decreasing in size up the stem; lowest leaf linear-lanceolate, 2–3 cm broad; flower solitary; perianth segments yellow, 3–4.5 cm long, mostly obtuse; outer segments violet-tinged on the back, lanceolate to oblong; inner segments oblong-rhomboidal to oboblong; stamens half the length of perianth; filaments naked, gradually dilated at base and abruptly attenuate at apex, yellow; anthers yellow, as long as filaments; ovary slightly shorter than stamens, with subsessile stigma. April-July.

Gravelly slopes. — Centr. Asia: Dzu.-Tarb. (Dzungarian Ala Tau, S. part). Endemic. Described without precise indication of origin.

32. **T. platystemon** Vved. in Bull. Univers. As. Centr. 21 (1935) 150.

Perennial; bulb ca. 2 cm thick; tunics coriaceous, reddish-brown, the inner surface covered at summit with appressed hairs; stem 17 cm long, the stem and peduncle glabrous; leaves 4, scattered, glabrous, the lower spreading; lowest leaf linear-lanceolate, 2 cm broad; flowers 2 (always ?); perianth segments yellow, 4 cm long, obtusish; outer segments violet-tinged, oblong-rhomboidal; stamens two-fifths the length of perianth; filaments naked, dilated above the middle, gradually narrowed at both ends, yellow: anthers yellow, slightly longer than filaments; ovary about half the length of stamens, with sessile stigma. June.

Centr. Asia: Pam.-Al. (Sary-biya). Endemic. Described from the location indicated. Type in Leningrad.

Note. A species known from a single specimen and needing more study.

33. **T. altaica** Pall. ex Spreng. Syst. II (1825) 63; Ldb. Fl. Riss. IV 135; Kryl., Fl. Zap. Sib. III, 638. — Ic.: Ldb. Ic. pl. fl. Ross. II (1830) t. 134.

Perennial; bulb ovoid; 1.5–2 cm thick; tunics coriaceous, often almost papery, brown, hairy all over the inner surface; stem 10–35 cm long, the upper part of stem and peduncle pubescent; leaves 3 (4), commonly
347 spreading, scattered, glaucous, crisp, glabrous or (the upper) more or less pubescent, ciliate, progressively decreasing in size up the stem, not surpassing the flower; lowest leaf lanceolate to oblong, 1–4 cm broad; flower solitary; perianth segments yellowish or yellow, 2.5–5 cm long, acuminate or acute; outer segments greenish or dingy violet, oblong-rhomboidal or oblong, slightly longer than the oblong-obovate to oboblong inner segments; stamens two-fifths to one-half the length of perianth; filaments naked, yellow; anthers yellow, half as long again to twice as long as filaments; ovary slightly shorter than stamens, with subsessile stigma; capsule 1.5–2 cm in diameter, 2.5–4 cm long. May.

Steppes and stony slopes. — W. Siberia: Irt. (E.), Alt. (SW); Centr. Asia: Balkh. (E.), Dzu.-Tarb. Endemic (?). Described from Imaus (Altai).

Note. The tulip reported by Fedchenko for Ala-kul' (Rast. Turk. (1915) 245) as T. iliensis, should apparently be referred to this species,

34. **T. dubia** Vved. in Bull. Univers. As. Centr. 21 (1935) 148.

Perennial; bulb ovoid, 1–2 cm thick; tunics blackish-brown or brown, papery, hairy all over the inner surface; stem 10–25 cm long, the upper part of stem and peduncle pubescent; leaves 2–4, more or less spreading, approximate, crisp, more or less pubescent, ciliate, abruptly decreasing in size up the stem, not surpassing the flower; lowest leaf ovate to oblong, 1.5–3 cm broad; flower solitary; perianth segments 2–4 cm long, equal, yellow or yellowish (?); outer segments violet-tinged outside, oblong-rhomboidal, acute or acuminate; inner segments oboblong, obtusish to obtuse; stamens half the length of perianth; filaments naked, yellow; anthers yellow, two-thirds the length of filaments; ovary two-thirds the length of stamens, with subsessile stigma. June.

Fine-textured slopes, with or without admixture of gravel, in the upper mountain zone. — Centr. Asia: T. Sh. (W.). Endemic. Described from the Chotan River. Type in Leningrad.

Note. Hybridizing with T. Kaufmanniana Rgl.

35. T. iliensis Rgl. in Gartenfl. XXVIII (1879) 162, tab. 975, f. c-d et 227, tab. 982, f. 4-6. — T. Hoeltzeri Dykes, Notes (1930) 74, tab. XXVIII (exlus syn.).

Perennial; bulb ovoid, 1-2 cm thick; tunics subcoriaceous, brownish-black, the inner surface covered at summit and at base with appressed hairs; stem 10-30 cm long, glabrous, or the upper part and peduncle pubescent, or rarely the peduncle glabrate; leaves (3) 4, scattered, spreading or rarely reclinate, glabrous or the uppermost sometimes
348 pubescent, mostly scarcely crisp, commonly not surpassing the peduncle; lowest leaf sublorate to linear-lanceolate, 0.7-1.5 cm broad; flower solitary; perianth segments yellow, 2.5-3.5 cm long, acute or acuminate; outer segments commonly violet-tinged, elliptic-rhomboidal; inner segments oboblong; stamens two-fifths to one-half the length of perianth, naked, slightly dilated at the middle and gradually narrowed at both ends, yellow; anthers half as long again as filaments, yellow; ovary two-thirds the length of stamens, with subsessile stigma. May.

Among shrubs. — Centr. Asia: T. Sh. (Ketmen-tav: Podgornoe). **Gen. distr.**: Dzu.-Kash. Described from the upper course of the Ili River. Type in Leningrad.

Note. A similar species. T. Dykesiana m. (= T. Hoeltzeri Rgl. in herb.! = T. Triphylla var. Hoeltzeri Rgl. in Gartenfl. (1884) 34, tab. 1144 f. 3, 4, a,b, non T. Hoeltzeri Dykes l.c.), described without precise indication of origin, is distinguished in the first place by the filaments being strongly dilated in upper part and abruptly narrowed toward the anther. The very incomplete specimens from Karachok. (A. Regel) belong perhaps to this species.

36. T. ferganica Vved. in Bull. Univers. As. Centr. 21 (1935) 148.

Perennial; bulb ovoid, (1)-1.5-3 cm thick; tunics blackish-brown or black, firmly coriaceous, the inner surface appressed-woolly at summit and at base; stem (5)-10-40 cm long, the upper part of stem and peduncle pubescent; leaves 3, approximate, rarely scattered, commonly spreading, more or less pubescent, ciliate, crisp, rather abruptly decreasing in size up the stem, not surpassing the flower; lowest leaf lanceolate or oblong, 1.5-4 cm broad; flowers 1 (2); perianth segments 2.5-6.5 cm long, yellow; outer segments violet-tinged outside, oblong to oblong-rhomboidal, gradually acuminate or acute; inner segments oboblong, rather abruptly acuminate to a pubescent point; stamens two-fifths to one-half the length of perianth; filaments naked, yellow; anthers yellow, slightly longer than filaments; ovary slightly shorter than stamens, with subsessile stigma; capsule 1.5-2 cm broad, 2.5-4 cm long. May-June.

Stony and fine-textured slopes in the middle mountain zone. — Centr. Asia: Pam.-Al. (Alai Range), T. Sh. (Fergana and Chatkal ranges). Endemic. Described from the Kugart River. Type in Tashkent.

37. T. anisophylla Vved. in Bull. Univer. As. Centr. 21 (1935) 147. — T. Kolpakovskiana var. humilis Rgl. in A. H.P. VIII (1884) 651.

Perennial; bulb ovoid, (1.5)-2-2.5 cm thick; tunics coriaceous, tawny, covered inside at summit and at base with appressed hairs; stem
349 (3)-8-20 cm long; peduncle glabrous or rarely with very minute scattered

pubescence; leaves 3, commonly crowded, spreading, glabrous, crisp, reaching the flower, unequal; lowest leaf commonly oblong-ovate, 1.5–3 cm broad; upper leaves much reduced, the uppermost sometimes bractlike; flowers 1 (2); perianth segments yellow, 1.5–3.5 cm long, obtuse or obtusish; outer segments violet-tinged, elliptic to rhomboidal-elliptic; inner segments obovate to obovate-oblong; stamens one-half the length of perianth, glabrous, entire; anthers yellow; style about half the length of ovary. March.

Middle mountain zone. — Centr. Asia: Pam.-Al. (Darvaz). Endemic. Described from Kala-i-khum. Type in Leningrad.

38. **T. Korshinskyi** Vved. in Bull. Univer. As. Centr. 21 (1935) 149.

Perennial; bulb ovoid, 1.5–2–(3) cm thick; tunics coriaceous, nearly black, the inner surface covered at summit and at base with appressed hairs; stem (5)–10–20 cm long, the stem and peduncle glabrous; leaves (2 or 3) 4 (5), subapproximate, strongly spreading or sometimes reclinate; glabrous, crisp, commonly surpassing the flower; lowest leaf lanceolate, 1.5–3 cm broad, the other reduced; flower 1 (2); perianth segments white, apparently with a yellow basal blotch, 1.5–4 cm long; outer segments violet-tinged outside, linear-lanceolate to lance-rhomboidal, up to half as long again as the oblanceolate-rhomboidal to obovate-rhomboidal inner segments, stamens half the length of perianth; filaments naked, yellow, violet-tinged on the back, linear-oblong, abruptly narrowed at apex; anthers yellow; style up to half as long as ovary. March-June.

Stony slopes in the middle and upper mountain zones. — Centr. Asia: Pam.-Al. Endemic. Described from Sary-dash. Type in Leningrad.

39. **T. tianschanica** Rgl. in A. H. P. VI (1880) 508. — Ic.: Rgl. in A. H. P. VIII (1884) t. 5.

Perennial; bulb ovoid, $1\frac{1}{2}$–2 cm thick; tunics subcoriaceous to almost papery, blackish-brown, produced, the inner surface appressed-hairy at summit; stem 6–15 cm long, glabrous; leaves 3, approximate, spreading, commonly crisp, surpassing the flower; lowest leaf lanceolate, 7–10 mm broad, commonly smooth-margined, 2–3 times as broad as the narrowly linear-lanceolate ciliate upper leaves; flower solitary; perianth segments yellowish, 15–25 mm long, oboblong, gradually tapering into petiole, obtuse, glabrous; outer segments dingy violet outside, slightly longer than the inner; stamens about half the length of perianth; filaments yellow, naked, abruptly dilated above the middle, gradually narrowed toward base;
350 anthers yellow; oblong-elliptic, $2\frac{1}{2}$–3 mm long; ovary slightly shorter than stamens, long-styled; capsule oblong, ca. 1 cm broad, 2 cm long, long-beaked. May-June.

Stony slopes in the alpine zone. — Centr. Asia: T. Sh. (Centr. T. Sh.), rare. **Gen. distr.**: Dzu.-Kash. Described from the Agiaz River. Type in Leningrad.

40. **T. tetraphylla** in A. H. P. III (1875) 296. — T. Kesselringii Rgl. in A. H. P. V (1878) 637. — Ic.: Rgl. in Gartenfl. XXVIII (1879) t. 964.

Perennial; bulb ovoid, 1.5–2 cm thick; tunics black, the inner surface appressed-hairy at summit; stem (5)–15–20 cm long, the stem and peduncle glabrous; leaves (3 or 4) 5 or 6, (7), crowded, spreading, crisp,

glaucous, ciliate, sublorate, surpassing the flower; lowest leaf 1–1.5 cm broad; flowers 1 or 2 (to 4), nodding in bud; perianth segments (2)–3–4 cm long, acutish to obtusish, yellow; outer segments violet-tinged, greenish on the back, oblong-to oblong-rhomboidal; inner segments dingy green on the back at base, oboblong to oblong-obovate; stamens one-third the length of perianth; filaments naked, yellow, dilated in upper part, gradually narrowed toward base; anthers yellow, linear-oblong, 7–8 mm long; ovary shorter than stamens, short-styled. May.

Stony slopes. — Centr. Asia: T. Sh. (Centr. T. Sh.). Gen. distr.: Dzu.-Kash. Described from the Kochkur River. Type in Leningrad.

Note. Specimens displaying transition toward T. Kolpakovskiana Rgl. are known from the Alma Ata area. They are evidently of hybrid origin.

41. T. **hissarica** M. Pop. et Vved. in Bull. Univers. As. Centr. 21 (1935) 149.

Perennial; bulb oblong-ovoid, 1–1.5 cm thick; tunics brown or grayish, papery, the inner surface appressed-hairy at summit, strongly produced; stem ca. 7 cm long, glabrous; leaves 4, subverticillately crowded, spreading, crisp, glabrous, smooth- or slightly ciliate-margined, linear, ca. 5 mm broad, surpassing the flower; flower solitary; perianth segments yellowish, 17–20 mm long, acute, glabrous; outer segments lanceolate, greenish on the back, two-thirds as broad as and slightly longer than the inner; inner segments commonly oblong, gradually narrowed into claw; stamens two-thirds the length of perianth; filaments naked, gradually attenuate from base; anthers linear-oblong, 6 mm long; ovary slightly shorter than stamens, with a very long style. June.

The alpine mountain zone. — Centr. Asia: Pam.-Al. (Gissar Range). Endemic. Described from Mura Pass. Type in Tashkent.

351 42. T. **Krauseana** Rgl. in A. H. P. VI (1880) 508. — Ic.: Lipsch. in Bull. Jard. Bot. Acad. Sc. URSS XXX (1932) 735.

Perennial; bulb ovoid, 2–4 cm thick; tunics coriaceous, brown, more or less produced, the inner surface appressed-hairy especially at summit and at base; stem 7–20 cm long, pubescent; leaves 3, approximate, spreading, violet-speckled, pubescent, crisp, surpassing the flower; lowest leaf larger, oblong, 2–3 cm (in sterile plants up to 5 cm) broad; upper leaves linear-lanceolate; flower solitary; perianth segments pale yellow (?), 20–30 mm long, acute; outer segments pubescent outside; filaments naked; anthers several times the length of filaments. April.

Stony fine-textured slopes. — Centr. Asia: T. Sh. (Kara-tau). Endemic. Described from Kara-tau mountains. Type in Leningrad.

Note. A very dubious species. The authentic plant is very unreliable (bulb missing and flowers scarcely open) and almost unidentifiable. Lipschitz's specimens, on which the description was based, most probably represent a preflowering stage of T. Greigii Rgl. The specimen from Baisun (Musa) is evidently a nonflowering T. Micheliana Hoog. plant.

Section **SPIRANTHERA** Vved. hoc loco. — Anthers opening gradually and slowly from apex to base, becoming contorted; filaments naked; ovary with subsessile stigma; bulb tunics more or less hairy on the inside.

43. **T. Kaufmanniana** Rgl. in Gartenfl. XXVI (1877) 194, t. 906.

Perennial; bulb ovoid, 1.5–4 cm thick; tunics blackish-brown, coriaceous, the inner surface more or less covered with appressed hairs; stem (10)–20–30–(50) cm long, the upper part of stem and peduncle pubescent; leaves 2 or 3, spreading or slightly reclinate, scattered, glaucous, usually not surpassing the flower; lowest leaf lanceolate or oblong to oblong-elliptic, 2–13 cm broad; flower solitary; perianth segments white with a yellow basal blotch or yellowish throughout, acute to obtuse; outer segments broadly suffused on the back with dingy violet or reddish-violet, slightly exceeding the inner segments, 2.5–8 cm long, lanceolate to oblong-lanceolate; inner segments oblong-elliptic or oboblong; stamens half the length of perianth; filaments naked, yellow; anthers yellowish, linear, 3–4 times the length of filaments, gradually opening from apex to base, becoming contorted; ovary slightly shorter than stamens, with subsessile stigma; capsule 1.5–2 cm broad, 3–6 cm long. April-June.

Stony slopes in the lower and middle mountain zones. — Centr. Asia: T. Sh. (W. Tien Shan). Endemic. Described from Chirchik.

352 Note. Specimens collected by Knorring by the Kul'dambes River need further study. They have very narrow linear-lanceolate leaves and relatively narrow perianth segments, thus differing from the common T. Kaufmanniana.

Numerous natural hybrids between T. Kaufmanniana Rgl. and T. Greigii Rgl., known from Karshan-tau mountains, do not differ from artificially obtained hybrids (see Bull. Soc. Tosc. Ortic. XX (1895) 352, tab. 12; Dykes, Notes (1930) 105, tab. LII, LIII). Specimens occupying an exactly intermediate position between these species are rare; the plants mostly approach one or the other of the parents and appear to be color forms of the latter. T. suaveolens var. bicolor Rgl. (A.H.P. VIII (1884) 650) should partly be referred here.

Section **LOPHOPHYLLON** Vved. hoc loco. — Leaf solitary, with twisted longitudinal crests; bulb tunics hairy on the inside; filaments hairy; ovary short-styled.

44. **T. Regelii** Krasn. in Scrip. Bot. Hort. Univ. Petrop. II (1887) 21. — Ic.: Taliev, Tr. Prikl. bot, gen. i sel. XXIV 2 (1931) 66.

Perennial; bulb ovoid, 1.5–2.5 cm thick; tunics brown, coriaceous, slightly produced, the inner surface covered at summit and at base with appressed hairs; stem 5–10 cm long, glabrous; leaf solitary, amplexicaul, oblong to elliptic, acute, glabrous, smooth, with twisted longitudinal crests on the upper face, surpassing the flower, 1.5–3 cm broad; flower solitary; perianth segments white, yellow at base, 20–25 mm long, acutish to obtuse; outer segments lanceolate, dingy violet on the back, about half as broad as the inner segments, these oblong and ciliate at base; stamens about half the length of perianth; filaments hairy; anthers linear-oblong, 5–6 mm long; ovary slightly shorter than stamens, short-styled. April.

Stony slopes. — Centr. Asia: Endemic. Described from Kurtu, Andrakai. Type in Leningrad.

Section **ERIOSTEMONES** Boiss. Fl. Or. V (1884) 191. — Bulb tunics glabrous or hairy or arachnoid-lanate on the inside; flowers in most species small, inconspicuous; filaments pubescent, in one species (T. sogdiana) naked; ovary with subsessile stigma or with a more or less developed style, but this never longer than ovary.

44. * **T. violacea** Boiss. et Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 211; Boiss. Fl. Or. V (1884) 199. — Ic.: Bot. Mag. LI (1895) t. 7440.

Perennial; bulb ovoid, 1.5–3 cm thick; tunics blackish-brown, rigidly
353 coriaceous, the inner surface densely covered at summit with appressed hairs; stem 12–18 cm long, glabrous; leaves 3 (4), spreading, approximate, linear, glabrous, smooth, scarcely surpassing the flower; lowest leaf ca. 1 cm broad, broader than the others; flowers solitary; perianth segments violet, black and yellow-blotched at base, 30–40 mm long, oboblong, acute, pubescent at tips; inner segments slightly broader, ciliate at base; stamens half the length of perianth; filaments densely bearded at base; anthers oblong, 6 mm long; ovary slightly shorter than stamens, with subsessile stigma. April.

Dry slopes. Possibly occurring in Soviet Talysh. — **Gen. distr.**: Iran. Described from Khummes. Type in Leningrad.

45. **T. caucasica** Lipsky in Schedis ad Herb. Fl. Ross. (1902) No. 942. T. Lipskyi Grossh. in Fl. Kavk. I (1928) 223.

Perennial; bulb ovoid, 1–1.5 cm thick; tunics blackish-brown, papery, produced, the inner surface covered at summit with appressed hairs; stem 7–12 cm long, glabrous; leaves 2 (3), spreading, approximate, glabrous, smooth- or slightly ciliate-margined, not surpassing or only slightly surpassing the flower; lowest leaf broader than the others, linear-lanceolate, 8–12 mm broad; flower solitary; perianth segments pale rosy-violet, 20–35 mm long, acutish, ciliate at base; outer segments oblanceolate, two thirds as broad as the oboblong inner segments; stamens half the length of perianth; filaments bearded at base, anthers ellipsoid, ca. 2 mm long; ovary slightly shorter than stamens, short-styled. June.

Alpine mountain zone. — Caucasus: Cisc. (upper course of Kuban River). Endemic. Described from Uchkulan. Type in Leningrad.

45. * **T. silvestris** L. Sp. pl. (1753) 305; Shmal'g., Fl. II, 506 (p.p.). — Ic.: Redouté LII. III (1807) t. 165. — Exs.: Fl. ital. exs. No. 1025.

Perennial; bulb ovoid, 1.5–2 cm thick; tunics blackish-brown, coriaceous, the inner surface densely covered at summit and at base with appressed hairs or sublanate; stem 20–40 cm long, glabrous; leaves 2 or 3 or 4, scattered, spreading, glabrous, smooth, not surpassing the flower; lowest leaf broader than the others, linear-lanceolate, 12–20 mm broad; flower commonly solitary, nodding in bud; perianth segments yellow, 40–55 mm long, acute; outer segments often greenish outside, gradually acuminate, ciliate at base, bearded at apex; stamens two-fifths to one-half the length of perianth; filaments densely bearded at base; anthers linear-oblong, the length of filaments, 8–13 mm long; ovary slightly shorter than stamens, with subsessile stigma; capsule ca. 1.5 cm broad, 3 cm long, acuminate. April.

354 In woods; sometimes a weed. — **Gen. distr.**: W. Europe. Described from S. Europe.

Note. In recent times (Grossheim, Fl. Kavkaza II (1928) 223, Wulff, Fl. Kryma 3 (1930) 42), as the morphological and geographical limits of Tulipa silvestris L. had become fairly clear, this species has been reported for the Crimea and the Caucasus. The author has not, unfortunately, had the opportunity of seeing the specimens cited by Grossheim and Wulff, but he doubts if they would conform to the description given here which is based on west European plants.

46. **T. Biebersteiniana** Schult. Syst. VII (1829) 382; Boiss. Fl. Or. V (1884) 199. — T. silvestris var. minor Ldb. Fl. Ross. IV (1853) 136. — T. silvestris var. Niphontiana Czern. Consp. plant. Charc. Ucr. (1859) 64. — T. silvestris var. Biebersteiniana Rgl. in A.H.P. II (1873) 442; Shmal'g., Fl. II, 506. — T. bessarabica Zapal. Consp. Fl. Gal. I (1906) 167. — T. australis var. taurica Miscz. in Tr. Byuro prikl. bot. V (1912) 51. — T. silvestris M.B. Fl. taur.-cauc. I (1808) 270 et auct., non L. — Ic.: Syreisch., Ill. Fl. Mosk. gub. I (1906) 240. — Exs.: HFR No. 897.

Perennial; bulb ovoid, 1–2 cm thick; tunics coriaceous, blackish-brown to nearly black, the inner surface rather densely appressed-hairy at summit and at base; stem 15–30 cm long, glabrous; leaves 2 (3), spreading, rarely declined, scattered, glabrous, smooth- or rarely ciliate-margined, not surpassing the flower; lowest leaf broader than the others, narrowly linear-lanceolate, 5–20 mm broad; flowers 1–(5), nodding (?) in bud; perianth segments yellow, (15)–20–30–(40) mm long, acute, rather gradually tapering; outer segments often violet-tinged outside, lanceolate, up to twice as broad as the inner segments, these oblong-ovate, ciliate at base and more or less bearded at apex; stamens half the length of perianth; filaments densely bearded, anthers oblong, one-third to one-half the length of filaments, 3–4 mm long; ovary slightly shorter than stamens, with subsessile stigma; capsule 1–5 cm [sic] broad, 1.5–2.5 cm long, pointed at the top. April-May.

Steppes, slopes, scrub, forest glades, and river valleys. — European part: U.V. (S.), N. Dnp., V.-Don, Transv., Crim., L. Don, L.V.; Caucasus: Cisc., Dag., E. Transc.; W. Siberia: U. Tob., Irt. (?); Centr. Asia: Ar.-Casp., Balkh. (?), **Gen. distr.**: Bal.-As. Min. (?). Described from area between Mozdok and Kizlyar. Type in Leningrad.

Note. Ever since the earliest encounters with the Caucaso-Ukrainian tulip of the T. silvestris s. l. group, botanists have usually attempted its subdivision into two distinct taxonomic and systematic entities. This tendency has recently been considerably strengthened by ecological differences, but nobody has so far indicated any clear morphological
355 differences between T. Biebersteiniana plants of the steppe and meadow-forest belt, respectively. Even Taliev (Tr. Prikl. bot., gen i sel. XXIV 2 (1930) 111–112), one of the last botanists who studied T. Biebersteiniana s. l. and apparently knew it better than anyone else, did not succeed in establishing this distinction. The author is acquainted with T. Biebersteiniana only by way of the herbarium, not having been able to make any contribution to this problem. He merely has to mention that the T. Biebersteiniana type is the mesophytic race ("in hortis et vineis ad fluvium Terek, inter Mosdok et Kisljar" MB, l.c.),

whereas the xerophytic race is scarcely distinguishable from T. australis Link.

47. **T. patens** Agardh. ex Schult. Syst. VII (1829) 384; Kryl., Fl. Zap. Sib. III, 639. — T. tricolor Ldb. Fl. Alt. II (1830) 33. — T. silvestris var. tricolor Ldb. Fl. Ross. IV (1853) 136; Shmal'g., Fl. II, 506. — Ic.: Ldb. Ic. pl. Fl. Ross. II (1830) t. 135.

Perennial; bulb ovoid, 1–1.5 cm thick; tunics slightly coriaceous to almost papery, blackish-brown to grayish-brown, produced, the inner surface appressed-hairy at summit and at base; stem 10–25 cm long, glabrous; leaves 2 (3), commonly spreading, scattered, glabrous, smooth- or slightly ciliate-margined, not surpassing or only slightly surpassing the flower; lowest leaf broader than the others, narrowly linear-lanceolate, 4–10 mm broad; flowers solitary; nodding in bud; perianth segments white, yellow at base, 15–35 mm long, acuminate; outer segments dingy violet on the back, lanceolate, about half as broad as the inner, these oblong, ciliate at base and more or less bearded at apex; stamens half the length of perianth, densely bearded at base; anthers oblong, one-third to one-half the length of filaments, 3–4 mm long; ovary slightly shorter than stamens, short-styled; capsule ca. 1.5 cm thick, 2–2.5 cm long, pointed at the top, May.

Steppes, stony slopes, and solonchaks. — European part: L. Don, L.V.; W. Siberia: U. Tob., Irt., Alt. (SW). Endemic. Described from Siberia.

Note. Owing to the unusually close kinship with T. Bierbersteiniana and the fact that it is often impossible to distinguish the two species in the herbarium, it is difficult to define the western limit of T. patens. One should certainly regard with great suspicion the reports of this species for the southern part of the European USSR and for the Caucasus (Taliev, Tr. Prikl. bot., gen. i sel. XXIV, 2 (1931) 75–77).

48. **T. sogdiana** Bge in Mém. Acad. Pétersb. sav. étrang. VII (1854) 514; Boiss. Fl. Or. V, 193. — T. Androssovii Litw. in HFR (1908) No. 1895. — Exs.: HFR No. 1895.

Perennial; bulb ovoid, 0.75–1.5 cm thick; tunics blackish-brown or brown, coriaceous, mostly very firm, lanate on the inside; stem
356 10–15–25 cm long, the stem and peduncle glabrous; leaves 2 (3), more or less scattered, spreading, often finally somewhat twisted, sometimes slightly crisp, glabrous, smooth, linear to lance-linear; lowest leaf broader than the others, 4–10 mm broad, not surpassing the flower; flowers 1 (2); perianth segments white, almost imperceptibly rosy violet-tinged, yellow at base, 15–25–(30) mm long; outer segments oblong-lanceolate, acute, dingy violet outside, about half as broad as the inner; inner segments ovate, obtuse, mucronate, abruptly narrowed into the claw, sometimes slightly ciliate at base; stamens two-fifths to one-half the length of perianth; filaments yellow, naked; anthers oblong, 4–5 mm long, yellow, short-pointed; ovary shorter than stamens, with a very short style; capsule oblong, ca. 1 cm broad, ca. 1.5 cm long, short-beaked. March-April. (Plate XX, Figure 2 a, d).

Sandy, rarely clayey or stony deserts. — Centr. Asia: Kyz. K., Kara K., Amu D. Endemic. Described from area between Bukhara and Kermin. Type in Leningrad.

49. T. Buhseana Boiss. in Diagn. pl. or. II, 4 (1859) 98.

Perennial; bulb ovoid, 1–1.5 cm thick; tunics brown, coriaceous, the inner surface sparingly woolly at summit*; stem 15–40 cm long, glabrous or rarely in upper part pubescent; leaves 2, very scattered, declined or very rarely spreading, glabrous, more or less ciliate, linear; lowest leaf broader than the others, 3–6–10 mm broad, usually far from reaching the flowers; flowers (1) 2 or 3 (to 6); perianth segments white, yellow at base, (13)–15–20–30 mm long, acute; outer segments lanceolate, dingy violet outside, more or less bearded at the very base, about half as broad as the inner segments; inner segments oblong, rather gradually tapering into the claw, bearded and ciliate at base; stamens half the length of perianth; filaments yellow, densely bearded at base, commonly hairy above; anthers linear-oblong, 4–6 mm long, yellow or at apex faintly violet, short-pointed; ovary slightly shorter than stamens, short-styled; capsule oblong or rarely subglobose, ca. 1 cm in diameter, (1)–1.5–2 cm long, short-beaked. April.

Sandy and clayey soils. — Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Mtn. Turkm., T. Sh. (N. foothills). Gen. distr.: Dzu.-Kash., Iran., Described from Kara-chokat. Type in Leningrad.

Note. A species with a disjointed distribution area. The filaments of plants from the northern part of the area are nearly always hairy above the bearded base, and this characteristic distinguishes them from the typical T. Buhseana which has naked filaments. It should, however, be noted that the author has also seen individuals with hairy filaments in the southern
357 part of the distribution area. In addition, the northern race, which at one time he proposed to separate as T. Talievii, is apparently characterized by the drooping of buds and of faded flowers, but this characteristic needs confirmation with more ample material.

50. **T. turkestanica** Rgl. in A.H.P. III (1875) 296 (quoad spec. pamir-alaica). — T. silvestris var. turkestanica Rgl. in A.H.P. II (1873) 443. — Ic.: Rgl. Fl. turk. (1876) t. XXI. f. 1–4. — Exs.: Fl. turk. exs. No. 57.

Perennial; bulb ovoid, 1.5–2–(3) cm thick; tunics blackish-brown or brown, coriaceous, the inner surface woolly at summit; stem 10–25 mm long, the upper part of stem and peduncle pubescent, rarely glabrous; leaves 2, distant, spreading, glabrous, ciliate, linear; lowest leaf broader than the others, (5)–8–15 mm broad, usually surpassing the flowers, very rarely not reaching them; flowers 1–7, erect in bud; perianth segments white, yellow at base, 12–25 mm long, acute; outer segments lanceolate, dingy violet outside, rather gradually tapering into a claw, more or less bearded at base, ciliate, stamens half the length of perianth; filaments yellow, densely bearded at the dilated base, naked or hairy above; anthers linear-oblong, 4–6 mm long, commonly yellow, rarely faintly violet, short-pointed; ovary slightly shorter than stamens, short-styled; capsule oblong, ca. 1 cm in diameter, 1.5–2 cm long. March-April.

Clayey and stony slopes of foothills, up to 2500 m. — Centr. Asia: Pam.-Al., T. Sh. (Mogol—tau, Pasha-ata). Endemic. Type in Leningrad.

Note. Plants from Alai Valley need further study. According to Velichko they have pale yellow flowers.

* Young protective tunics have a sparse arachnoid pubescence over the entire surface.

51. **T. turcomanica** B. Fedtsch. in Fl. Turkmen. II (1932) 306 (quoad spec., exclus. descr.).

Perennial; bulb ovoid, 1.5–2.5 cm thick; tunics blackish-brown or brown, coriaceous, densely and delicately arachnoid-shaggy on the inside, stem 15–30 cm long, the stem and peduncle glabrous; leaves 2, very distant, reclinate or rarely spreading, glabrous, smooth or slightly ciliate, linear; lowest leaf broader, 6–15 mm broad, not surpassing the peduncle; flowers 1 (2 or 3); perianth segments white, yellow at base, 20–30 mm long, acute; outer segments lanceolate, dingy violet outside, bearded at base with long hairs, about half as broad as the inner; inner segments oblong-ovate,
358 acuminate, rather abruptly tapering at base into a short claw, long-ciliate and more or less bearded at base; stamens half the length of perianth, filaments yellow, densely bearded at the dilated base, sometimes hairy above; anthers linear-oblong, 4–6 mm long, yellow, short-pointed; ovary slightly shorter than stamens, short-styled. April.

Mountain slopes. — Centr. Asia: Mtn. Turkm. Gen. distr.: Iran. Described from Kopet Dagh. Type in Leningrad.

52. **T. bifloriformis** Vved. in Herb. Fl. As. Med. (1935) No. 576. — T. turkestanica auct. p.p. — T. biflora auct. fl. As. Med.

Perennial; bulb ovoid, 1.5–2 cm thick; tunics brown, coriaceous, densely and delicately arachnoid-shaggy on the inside; stem 10–25 cm long, the upper part of stem and peduncle commonly pubescent, very rarely glabrous; leaves 2, distant, reclinate, glabrous, ciliate, linear to linear-lanceolate; lower leaf broader, (6) 10–15 mm broad, usually surpassing the flower; flowers (1) 2–8 (to 11); perianth segments white, yellow at base, (11)–15–20–(30) mm long, acute; outer segments oblong-lanceolate, dingy violet outside, bearded at base, two-thirds as broad as the inner, inner segments oblong, acuminate, more or less tapering into a claw, slightly bearded at base, long-ciliate; stamens about half the length of perianth; filaments yellow, densely bearded at base with long hairs, commonly hairy above; anthers linear-oblong, 5–6 mm long, often violet, rarely yellow, very short-pointed; ovary slightly shorter than stamens, short-styled; capsule commonly oblong, 1–1.5 cm in diameter (1)–1.5–2.5(3) cm long, short-beaked. March-July.

Clayey and stony slopes in foothills, up to 1900 m. — Centr. Asia: Syr D., T. Sh. (W.), Pam.-Al. (?). Endemic. Described from Tashkent. Type in Tashkent.

Note. The plants from Kara-tau are very squat and they have very hairy mostly produced bulb tunics; leaves usually surpassing the flower; buds and faded flowers erect (T. orthopoda m. in herb.). On the other hand, the plants from the Aleksandrovskii Range have less hairy tunics, while the button and faded flowers are nodding (T. binutans m. in herb.).

Additional collections are needed from the Alai Range, as the material from this area (Shakhimardan, Sary-kamysh, Ak-bura) is insufficient.

53. **T. biflora** Pall. Reise III (1876) 727, t. D, f. 3; Boiss. Fl. Or. V 200, Shmal'g., Fl. II, 506. — T. silvestris var. biflora Ldb. Fl. Ross. IV (1853) 136. — Ic.: Fl. Yugo-Vost. III (1929) Figure 187.

359 Perennial; bulb ovoid, 1–1.5 cm thick; tunics brown or grayish-brown, papery, produced and slightly clasping the stem base, finely arachnoid-woolly on the inside; stem 10–20 cm long, the stem and peduncle glabrous; leaves mostly 2, distant, declined, very rarely spreading, glabrous, smooth, linear; lower leaf broader, 3–7–(10) mm broad, slightly surpassing the flowers; flowers 1 or 2 (to 6); perianth segments white, yellow at base, 13–25 mm long, acute; outer segments lanceolate, dingy violet outside, bearded at base, about half as broad as the inner; inner segments oblong to oblong-ovate, acuminate, gradually tapering into a rather long claw, bearded at base, ciliate; stamens half the length of perianth; filaments yellow, bearded at base; anthers oblong, 2–3 mm long, yellow, with a very short point; ovary scarcely shorter than stamens, short-styled, capsule short-beaked, 8–13 mm in diameter, about as long as or slightly longer than broad. April.

Solonetz steppes, sonoletz soils and clayey slopes. — European part: Bl. (??), Crim. (??), L. V.; W. Siberia: U. Tob. (S.), Irt. (S.); Centr. Asia: Ar.-Casp. **Gen. distr.**: Dzu.-Kash. Described from deserts adjacent to the Caspian.

54. **T. polychroma** Stapf. in Denkschr. Akad. Wien. L. (1885) 18. — T. biflora var. grandiflora Grossh. in Grossh. et Schischk. Pl. orient. exsicc (1928) No. 353.

Perennial; bulb ovoid, 1–1.5 cm thick; tunics brown, coriaceous, slightly produced, finely arachnoid-woolly on the inside; stem 6–15 cm long, the stem and peduncle glabrous; leaves 2, rather distant, falcately spreading, glabrous, smooth or rarely slightly ciliate, linear; lower leaf broader, 5–10 mm broad, slightly surpassing the flower; flowers 1 (2); perianth segments white, yellow at base, 15–25 mm long, acutish; outer segments oblong-lanceolate, dingy violet outside, bearded at base, half as broad as the inner; inner segments broadly oblong, rather gradually tapering into a claw, densely ciliate at base, often whitish; stamens half the length of perianth; filaments yellow, bearded at base; anthers oblong, 2–4 mm long, yellow, with a very short point; ovary slightly shorter than stamens, short-styled. April.

Dry slopes. — Caucasus: Cis. (E.), E. Transc. **Gen. distr.**: Iran. Described from Iran: Shurab. Cotype in Leningrad.

55. **T. koktebelica** Junge in Trav. Mus. Bot. Acad. Pétersb. XVI (1916) 112.

360 Perennial; bulb ovoid, 1–(1½) cm thick; tunics brown, coriaceous, slightly produced, finely arachnoid on the inside; stem 10–20 cm long, the stem and peduncle glabrous, the aerial part of stem much shorter than the underground part; leaves 2, rather distant, falcately spreading, glabrous, nearly smooth-margined, linear; lower leaf broader, 6–15 mm broad, slightly surpassing the flower; flowers 1 or 2; perianth segments white, yellow at base, 18–25 mm long, acutish; outer segments oblong-lanceolate, dingy violet outside, glabrous at base, two-thirds as broad as the inner; inner segments oblong-lanceolate, rather abruptly tapering at base into a fairly long claw, ciliate at base; stamens half the length of perianth; filaments yellow, slightly bearded at base; anthers oblong, 2.5–3 mm long, yellow, with a very short point; ovary slightly shorter than stamens, short-styled. March.

Dry stony clay slopes.— European part: Crim. Endemic. Described from Koktebel' [Planerskoe]. Type in Leningrad.

Note. An exceedingly rare species, known only from the classical location; closely related to T. Callieri and requiring further study.

56. **T. Callieri** Halacsy et Lev. in Jahreskat. Wien. Tauschanst. (1897) 69.

Perennial; bulb ovoid, ca. 1.5 cm thick; tunics brown, subcoriaceous, produced and slightly clasping the stem base, densely and finely arachnoid-woolly on the inside; stem 10–15 cm long, glabrous, at anthesis almost entirely concealed underground; leaves 2, approximate, spreading, glabrous, slightly ciliate-margined, linear; lower leaf broader, 5–10 mm broad, greatly surpassing the flowers (up to twice as long); flowers 1 (2 or 3); perianth segments white, yellow at base, 13–17 mm long, obtuse; outer segments greenish-gray outside, about half as broad as the inner; filaments bearded at base, the beard twice the length of anthers; ovary short-styled; capsule subglobose, ca. 1 cm in diameter. April.

Mounds.— European part: Crim. Endemic. Described from Sudak.

Note. A very rare plant, known only from two locations (Sudak, Sarylar). The author has not had an opportunity of seeing flowering specimens and his conclusions are based solely on a single fruiting specimen collected by Transhel at the classifical location.

57. **T. orithyioides** Vved. in Bull. Univers. As. Centr. 21 (1935) 150.

Perennial; bulb ovoid, ca. 1.5 cm thick; tunics almost papery, brownish-gray, rather sparsely and finely arachnoid-shaggy on the inside; stem 7–10 cm long, glabrous; leaves 2, closely approximate to subopposite,
361 spreading, crisp, glabrous, smooth, greatly surpassing the flower; lower leaf linear-lanceolate, broader, 1–1.5 cm broad; flower solitary; perianth segments white, yellow at base, 18–24 mm long, acutish; outer segments dingy violet outside, lanceolate, glabrous; inner segments gradually narrowed into a claw, oblanceolate, ciliate at base, slightly shorter; stamens half the length of perianth; filaments yellow, long-ciliate below; anthers linear-oblong, 5–6 mm long, dingy violet, with a very short cusp; ovary as long as stamens, with a very long style; capsule oblong, ca. 1.5 cm broad, 2–3 cm long, long-beaked. June.

Centr. Asia: Found in Chul'bair mountains on a stony slope, at an altitude of 3000 m. Endemic. Described from the vicinity of Khodzha-barku. Type in Tashkent.

Note. It is possible that the specimens, severely damaged by insects, that were collected by Lipsky at the Karshibet Glacier, belong to this species.

58. **T. dasystemonoides** Vved. in Bull. Univers. As. Centr. 21 (1935) 147.

Perennial; bulb ovoid, 1–1.5 cm thick; tunics blackish-brown, subcoriaceous, the inner surface densely woolly at tips; stem 7–15 cm long, the stem and peduncle glabrous; leaves 2, more or less approximate, commonly spreading, glabrous, smooth, linear, greatly surpassing the flower; lower leaf broader, 6–12 mm broad; flowers 1 (2); perianth segments pale yellow, 15–25 mm long, acutish; outer segments lanceolate,

dingy violet outside, glabrous, two-thirds as broad as the inner; inner segments oblong, gradually tapering into a claw, more or less ciliate at base; filaments half the length of perianth, yellow, hairy at base; anthers linear-oblong, yellow, 4–5 mm long, with a very short cusp; ovary about the length of stamens, with a rather long style. June-September.

The alpine mountain zone. — Centr. Asia: Tien Shan. Endemic. Described from Talass Ala Tau: Maidantal. Type in Leningrad.

Note. Known from a few locations in W. Tien Shan (Maidantal, Chotan, Makhbal'kul', Dorofeevka). Related to T. dasystemon Rgl., from which it differs in the first place in densely woolly inner surface of the bulb tunics. The characteristics distinguishing it from T. turkestanica Rgl. are the subcoriaceous tunics and the more developed style.

59. **T. dasystemon** Rgl. in A.H.P. VI (1880) 507. — Orithyia dasystemon Rgl. in A.H.P. V (1877) 261.

Perennial; bulb ovoid, 1–1.5 cm thick; tunics blackish-brown or brown, papery, glabrous or with few appressed hairs at summit; stem 10–20–(30) cm long, the stem and peduncle glabrous; leaves 2, distant,
361 reclinate, glabrous, smooth- or rarely slightly ciliate-margined, linear; lower leaf broader, 5–15 mm broad; flower solitary; perianth segments pale yellow, 15–30 mm long, acute; outer segments lanceolate, dingy violet outside, glabrous, about half as broad as the inner; inner segments oblong-ovate, rather gradually tapering into a long claw, bearded and ciliate at base; stamens half the length of perianth; filaments yellow, hairy; anthers oblong, 3–5 mm long, yellow, with a very short cusp; ovary scarcely shorter than stamens, with a rather long style; capsule oblong, 0.75–1 cm broad, 1.5–2.5 cm long, with beak ca. 5 mm long. May-June.

Subalpine and alpine mountain zones. — Centr. Asia: Pam.-Al., T. Sh. **Gen. distr.**: Dzu.-Kash. Described from the vicinity of Alma Ata. Type in Leningrad.

Note. Another tulip occurring in the Fergana Range, in addition to T. dasystemon, grows apparently at lower altitudes and has firmer coriaceous bulb tunics. Cultivated specimens have displayed bright yellow flowers (T. paradasystemon m. in herb.).

60. **T. tarda** Stapf. in Bot. Mag. (1933) t. 9321.

Perennial; bulb ovoid, 1.5–3 cm thick; tunics blackish-brown, coriaceous, naked; stem 5–20 cm long, stocky, glabrous; peduncles pubescent; leaves 3–7, crowded, commonly spreading, green, with a purple margin 1–2 mm broad, glabrous, smooth-margined or more or less ciliate, slightly crisp, linear; lowest leaf broader than the others, 8–15 mm broad, surpassing the flowers; flowers 1–8; perianth segments white, 20–40 mm long, acute, with a large yellow basal blotch occupying most of the surface, or rarely yellow throughout; outer segments lanceolate to oblong-lanceolate, dingy violet outside, commonly glabrous, half as broad as the inner; inner segments oblong, gradually narrowed into a long claw, densely ciliate at base; stamens half the length of perianth; filaments yellow, densely bearded at base with long hairs; anthers linear-oblong, 5–7 mm long, yellow, with a very short cusp; ovary slightly shorter than stamens, with a rather long style. April-May. (Plate XXI, Figure 2 a–e).

Rocky and gravelly slopes. — Centr. Asia: T. Sh. Endemic. Described from Centr. Asia: "probably Turkestan".

Note. This very interesting species is known from a few locations in close proximity to each other (Kastek, Dzhol-bulak, Dzhil'-aryk).

Specimens (flowering) collected near Kumbel' Pass and at the Yassy River may be referred to this species.

Section **ORITHYIA** Baker in Journ. Bot. 14 (1874) 277 (pro subgen). — Orithyia Don in Brit. Flow. Gard. IV (1838) t. 336. — Bulb tunics naked on the inside or appressed-hairy at summit; filaments naked; style as long as ovary.

363 61. **T. heteropetala** Ldb. Ic. pl. fl. Ross. I (1829) 21, t. 85. — Ornithogalum oxypetalum Ldb. Fl. Alt. II (1830) 27. — Orithyia oxypetala Kunth Enum. IV (1843) 227; Ldb. Fl. Ross. IV, 137. — O. uniflora var. oxypetala Rgl. in Izv. O-va lyub. est., antr. i etnogr. XXI, 2 (1876) 142; Kryl., Fl. Zap. Sib. III, 641.

Perennial; bulb ovoid, 1–1.5 cm thick; tunics blackish-brown, papery, the inner surface appressed-hairy at summit; stem 10–20 cm long, glabrous; leaves 2, very distant, spreading, linear, glabrous, smooth; lower leaf broader, 5–7 mm broad, not surpassing the flower; flower solitary, erect; perianth segments yellow, 17–25 mm long, very acute, glabrous; outer segments lanceolate, dingy violet outside, two-thirds as broad as the inner; inner segments oblong, gradually tapering into a long narrow petiole; stamens two-thirds the length of perianth; filaments yellow, naked, dilated below the middle; anthers linear-oblong, 5–6 mm long, yellow; ovary as long as stamens, with a very long style. April-May.

Steppes. — W. Siberia: Alt. Endemic. Described from Bukhtarminsk. Type in Leningrad.

62. **T. uniflora** (L.) Bess. ex Baker Journ. Linn. Soc. XIV (1874) 295. — Ornithogalum uniflorum L. Mant. (1867) 62. — Orithyia uniflora Don in Brit. Flow. Gard. IV (1838), 336; Ldb. Fl. Ross. IV, 137. — O. nutans Trautv. Pl. imag. et descr. (1844) 15, t. 10. — O. uniflora var. typica Rgl. in Izv. O-va lyub. estv., antr. i etnogr. XXI, 2 (1876) 142; Kryl., Fl. Zap. Sib. III, 641. — T. nutans B. Fedtsch. in Bot. Jahrbuch L. (1914) 617.

Perennial; bulb ovoid, 1–2 cm thick; tunics papery, blackish-brown, produced, appressed-hairy on the inside at summit; stem 10–25 cm long, glabrous; leaves 2, subapproximate, commonly spreading, glabrous, smooth, narrowly linear-lanceolate, usually slightly surpassing the flower; lower leaf broader, 4–10 mm broad; flower solitary, nodding in bud (always ?); perianth segments yellow, 15–30 mm long, glabrous, obtuse or obtusish; outer segments lanceolate or oblanceolate, dingy violet outside, two-thirds as broad as the inner; inner segments obovate, gradually narrowed into a claw; stamens two-thirds the length of perianth; filaments yellow, naked, gradually attenuate from base; anthers oblong, 3–5 mm long, yellow; ovary the length of stamens, with a very long style; capsule 0.75–1 cm broad, 2–3.5 cm long, very long-beaked, narrowed at base. May.

Stony slopes and exposed places (steppes?). — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau. (?); Centr. Asia: Dzu.-Tarb. (Tarbagatai). **Gen. distr.**: Mongolia. Described from Sinyaya Sopka (Altai).

364 63. **T. heterophylla** (Rgl.) Baker in Journ. Linn. Soc. XIV (1874) 295. — Orithyia heterophylla Rgl. in Bull. Soc. Nat. Mosc. XLI, I (1868) 440. — Ic.: Rgl. Fl. turk. (1876) tab. XXI, f. 11–12.

Perennial; bulb elongate-ovoid, 1–1.5 cm thick; tunics papery, blackish-brown, naked, produced at the top and clasping the stem base; stem 5–15 cm long, glabrous; leaves 2, more or less spreading, opposite, narrowly linear-lanceolate, glabrous, smooth, not surpassing the flower; lower (outer) leaf broader, 6–10–(15) mm broad; flower solitary, commonly nodding; perianth segments yellow, dingy violet or dingy green outside (the outer more broadly so), 15–30 mm long, obtuse or acutish, glabrous, oblong-oblanceolate to oblanceolate; stamens two-thirds the length of perianth; filaments yellow, naked; anthers oblong-ellipsoid, ca. 2.5 mm long, yellow; ovary about as long as stamens, with a very long beak, gradually narrowed toward base. June-July.

Stony slopes and meadows in the alpine zone. — Centr. Asia: T. Sh. (Centr.). **Gen. distr.**: Dzu.-Kash. Described from Trans-Ili Ala Tau. Type in Leningrad.

Genus 273. **ERYTHRONIUM** * L.**

L. Gen. plant., I, 1737, 92.

Perianth nodding, the 6 segments spreading and recurved above the campanulate base; inner segments with a transversal plait and small pits at base; stamens 6; anthers linear-oblong; filaments linear at base, fusiformly inflated at the middle and strongly attenuate at summit; style filiform, enlarged at the top; stigma 3-lobed, the lobes usually 2-sided; capsule obovoid, few-seeded.

1. Perianth segments averaging 2.5–5.5 cm in length, violet or rose (rarely white or yellowish); inner segments with a transversal plait and two oblong divergent lobes [auricles] at base. . . . . 1. **E. sibiricum** (Fisch. et Mey.) Kryl.

+ Perianth segments averaging 2.5–4 cm in length, white or pale yellow at base, yellowish-reddish outside, the upper part of the inner surface with small scattered red spots; inner segments with a wavy-toothed transversal plait at base . . . . . 2. **E. caucasicum** Woron.

365 1. **E. sibiricum** (Fisch. et Mey) Kryl., Fl. Zap. Sib. III (1929) 642. — E. dens canis var. sibiricum Fisch. et Mey. Ind. sem. Horti. Petr. VII, 1841; Linnaea XV, 1841; Ldb. Fl. Ross. IV, 134. — Exs.: HFR (genus E. dens canis L. var. sibiricum Fisch. et Mey.) No. 1042.

Perennial; bulb ovoid-cylindric, 3–6 cm long; stem erect, 12–30 cm long; leaves 2, borne about the middle of the stem, opposite, green, elliptic, acuminate, 8–15 cm long, 1.5–6 cm broad, the petiole amplexicaul, perianth segments oblong to sublanceolate, obtusish, violet or rose, rarely white or yellowish, 2.5–5.5 cm long, 5–12 cm broad, the 3 inner segments

* Greek name of a plant mentioned by Dioscorides; Greek erythros, red.

** Arranged by I.M. Krashennikov.

with a transverse plait and 2 small oblong obtuse spreading lobes [auricles], these ca. 1 mm long. (Plate XX, Figure 1, 1 a and 1 b).

Margins of coniferous woods (spruce-fir-cedar), wooded water meadows, near melting snow in the alpine zone, alpine tundras and meadows, and stony mounds in the foothills. — W. Siberia: Alt.; E. Siberia: Ang.-Say. Gen. distr.: Mongolia.

2. **E. caucasicum** Woron. in Acta. Inst. Bot. Ac. Sc. URSS I (1933) 214. — Exs.: Fl. cauc. exs. (genus E. dens canis L.).

Perennial; bulb ovoid-cylindric, 2–3 cm long; stem erect; leaves 2, about the middle of the stem, opposite, ovoid-oblong, glaucous, more or less speckled, the petiole amplexicaul; perianth segments lanceolate, 2.5–4 cm long, white or pale yellowish, with small scattered red spots in upper part; inner segments with a transverse plait, this surmounted by several teeth; stigma lobes 3–5 mm long, spreading. February-March. (Plate XXI, Figure 1 c and d).

Wood margins. — Caucasus: W. Transc. Endemic. Described from Cherkessiya, from Aibaz.

Genus 274. **LLOYDIA*** SALISB.**

Salisb. in Trans. Hortic. Soc. I(1812)328. — Nectarobotryum Ldb. Fl. Alt. II(1830) 36.

Perianth funnelform, the segments lanceolate or oblong-oboval, erect, style short; capsule obovoid; seeds small, oblong; small plants with solitary or rarely paired terminal flowers and narrow leaves.

366 1. Lowest cauline leaf 1–2 mm broad, linear, acuminate; perianth segments obtusely round-tipped, with violet nerves and a nectariferous pit above the base . . . . . 3. **L. serotina** (L.) Rchb.

\+ Perianth segments destitute of nectary . . . . . 2.

2. Terminal flowers 1–5, in a corymb; perianth segments greenish in lower part, rose above . . . . . 2. **L. rubroviridis** (Boiss. et Ky) Baker.

\+ Flowers 1–3, pure white; perianth segments narrow, oblong; lowest cauline leaf lanceolate, 5–7 mm broad . . . 1. **L. triflora** (Ldb.) Baker.

1. **L. triflora** (Ldb.) Baker in Journ. Linn. Soc. Bot. XIV (1874) 300. — Ornithogalum triflorum Ldb. in Mém. Acad. Petrop. V (1812) 529. — Gagea triflora Roem. et Schult. Syst. Veget. VII (1928) 551; Ldb. Fl. Ross. IV, 141. — Ic.: Ldb. Ic. tab. 379.

Perennial; bulbs small, globose, solitary; basal leaf solitary, linear, carinate; stem 15–30 cm long; cauline leaves 1 or few, oblong, gradually acuminate, the lowest largest; flowers in a corymbose raceme of 1–5 (mostly 3); peduncles slender, axillary, simple or rarely bifurcate, naked or bracteate; perianth segments obtusely round-tipped, pure white; anthers pale yellow; capsule trigonous. May-June.

Margins of broad-leaved woods and shrub thickets, rarely on slopes in dense grass stands; a spring plant, often loosely cespitose. — Far East: Uss., Sakh., Kamch. **Gen. distr.**: Jap.-Ch. Described from a specimen of Tilesius, probably collected somewhere at the coast of Sea of Okhotsk. Type in Leningrad.

* Named for E. Lloyd (1670–1709), museum curator in Oxford, who was first to find L. serotina in the mountains of Wales.

** Arranged by V.L. Komarov.

Plate XXI

1. Erythronium sibiricum (Fisch. et Mey.) Kryl., 1a,b) inner perianth segments. E. sibiricum; 1c,d) inner perianth segments. E.caucasicum Woron.— 2. Tulipa tarda Stapf, 2a) outer perianth segments; 2b) inner perianth segments; 2c), 2d) stamen, 2e) pistil.

2. **L. rubriviridis** (Boiss. et Ky) Baker in Journ. Linn. Soc. XIV (1877) 301; Boiss. Fl. Or. V, 202; Fedch., Rast. Turk. (1915) 248. — Gagea rubroviridis Boiss. et Ky, Diagn. Ser. 2, IV (1859) 106.

Perennial; bulbs ca. 1.5 cm across, ovaloid, with membranous tunics and small bulblets at base; basal leaves 1 or 2, narrowly linear; stem 10–20 cm long, bearing 2–4 narrowly linear leaves; peduncles elongated; flowers rarely solitary, mostly in a raceme of 3 to 5; segments of the
369 funnelform perianth elliptic-linear, not nectariferous, 3–5-nerved on the back; capsule oblong-clavate, flat at the top; seeds 3-angled, flat, smooth. April-June.

Dry grassy slopes, at altitudes from 500 to 2400 m, often loosely cespitose. — Centr. Asia: Amu D., Syr D. (Turkestan Range), Pam.-Al. Gen. distr.: E. Med., As. Min. Described from Mount Hermon. Type in Geneva.

3. **L. serotina** (L.) Rchb. Fl. Germ. Exs. (1830) 102; Kryl., Fl. Zap. Sib. 642; Turcz. Fl. baic.-dah. II, 210; Ldb. Fl. Ross. IV, 144. — L. alpina Salisb. in Trans. Hort. Soc. I (1812) 328. — Bulbocodium serotinum L. Sp. p. (1753) 294. — Nectarobothrium striatum Ldb. Fl. Alt. II (1830) 36. — Ornithogalum altaicum Laxm. in Nov. Comm. Acad. Petrop. XVIII (1774) 530. — O. striatum Willd. Sp. pl. II (1799) 112. — Gagea serotina Ker-Gawl. Quart. Journ. Roy. Inst. I (1816) 180. — Nectarobothrium Redowskianum Schlecht. et Cham. in Linnaea VI (1831) 585.

Perennial; bulb slender and long, completely enclosed together with stem base in vestiges of old leaves, these separating into fibers or entire; stem erect, 5–40 cm long; basal leaves commonly 2, filiform, to 1 mm broad, often exceeding the stem; cauline leaves up to 5, ca. 2 mm broad, the leaf subtending peduncle broader and bractlike; flowers solitary, rarely paired; perianth segments obovate, 1–1.5 cm long, white with a yellow blotch at base and 3 red or violet nerves; stamens and style much shorter than perianth; capsule globose, obtusely 3-angled, 3-celled, many-seeded; seeds strongly compressed. June-September.

Moss-and-lichen and stony arctic and mountain tundras, alpine meadows, moraines, gravelly declivities near melting snow, and rock crevices. Basal leaves develop before the stem. In mountains up to 3000 m. — Arctic: Arc. Eur. (Vaigach, Nenets tundras, Northern Urals), Arc. Sib., Chuk., An.; European part: bare peaks of Urals; Caucasus: Cisc., Dag., Centr. Asia: Pam.-Al., T. Sh., Dzu.-Tarb.; W. Siberia: Ob, Irt., Alt.; E. Siberia: Lena-Kol., Ang.-Say., Dau.; Far East: Kamch., Okh., Ze.-Bu., Uda, Uss. (Sikhote-Alin), Sakh. Gen. distr.: Mountains of Centr. Eur., Alt. Eur., Bal.-As. Min., Dzu.-Kash., Him., Mong., N. Am., Ber. Described from the Swiss Alps.

Genus 275. **SCILLA*** L.**

L. Gen. plant. (1737) 95.

Perianth campanulate or rotate, azure, rarely violet or nearly white,
370 the segments free or united at base; stamens 6, anthers pendulous; filaments

* From Greek scilla; the Latin name Scilla referring to the medicinal plant Urginea maritima Baker.

** Arranged by A. A. Grossgeim.

subulate above, more or less dilated below, inserted at base of perianth segments; ovary 3-celled, obtusely 3-angled, few-seeded; style 1, undivided; capsule globose, 3-angled; seeds black, globose or oblong; herbaceous plants, with a well-developed bulb and several basal leaves; scapes leafless; flowers few or numerous, in a raceme.

Economic importance. Some Scilla species are beautiful and suitable as ornaments in parks and gardens and for use as house plants. Noteworthy among Soviet representatives of the genus are, among others, the Caucasian S. Roseni, with very large flowers and recurved perianth segments, and the Central Asian S. Raevskiana, with dark purplish-violet flowers. S. sibirica and certain related native species can also be extensively used, particularly in view of the fact that, under suitable conditions, they become readily naturalized and do not need any care.

Various species of the genus Scilla (S. amoena, S. peruviana, S. hyacinthoides, etc.) have been introduced into the gardens of W. Europe.

1. Flowering at the end of summer and in fall; raceme many-flowered; flowers small, to 5 mm long . . . . . 2.
+ Flowering in spring (mountainous species in May and June) . . . . . 3.
2. Inflorescence (20) 40–60-flowered, racemose at anthesis, dense; flowers rose-purple; cells of ovary 1-ovuled (Far East). . 1. **S. japonica** Baker.
+ Inflorescence 6–20-flowered, corymbose at anthesis, later becoming elongated, loose; flowers reddish-violet; cells of ovary 2-ovuled (S. Ukraine, Crimea, Caucasus). . . . . 3. **S. autumnalis** L.
3. Flowers small, ca. 4–5 mm long, pale azure; capsule obovoid-cordate, cylindrically 3-valved (S. Transc.) . . . . . 2. **S. atropatana** Grossh.
+ Flowers always large, 5–15 mm long; capsule not cylindric . . . . . 4.
4. Leaves narrowly linear, 1.5–2 (3) mm broad, numerous (up to 10); flowers few (1–3), erect, slightly open, dark violet-blue (Centr. Asia). . . . . 17. **S. Raevskiana** Rgl.
+ Leaves more than 3 mm broad, commonly few . . . . . 5.
5. Perianth segments smaller, 5–8 mm long, elliptic-lanceolate; flowers erect; racemes rather many-flowered . . . . . 6.
+ Perianth segments 10–15 mm long, oval-oblong; flowers often nodding. . . . . 7.
6. Scape 10–25 cm long; leaves to 12 mm broad; raceme 2–10-flowered; perianth 8 mm long, bluish-violet (S. Ukraine, Crimea, Caucasus). . . . . 4. **S. bifolia** L.
371 + Scape 2–8 cm long, delicate; leaves short, to 6 mm broad; inflorescence 1–3-flowered; perianth 6–7 mm long, pale azure to nearly white (W. Transc.) . . . . . 5. **S. nivalis** Boiss.
7. Inflorescence a distinct and rather dense (2) 4–10-flowered raceme; plants of Central Asia . . . . . 8.
+ Inflorescence 1–3 (4) flowered, if racemose then loose; plants of the European part of the Soviet Union and of the Caucasus . . . . . 9.
8. Leaves oboblong-spatulate, 15–25 mm broad at broadest upper third; raceme relatively dense, 5–10-flowered (Bukhara) . . . . . 16. **S. bukharica** Dessjat.
+ Leaves broadly linear, 3–6 (10) mm broad; raceme relatively loose, 2–8-flowered (Centr. Asia) . . . . . 15. **S. puschkinioides** Rgl.

9. Perianth segments large, 17–30 mm long, recurved; ovary pyriform or obovoid (S. Transc.) . . . . . 6. S. Roseni C. Koch.
+ Perianth segments smaller, sometimes not recurved; ovary pyriform segments smaller, sometimes not recurved . . . . . 10.
10. Bracts at base of pedicels 2, prolonged into a rather long recurved subulate appendage; racemes loosely many-flowered; scapes 20–40 cm long (Talysh, E. Transc.) . . . . . 8. S. Hohenackeri Fisch. et Mey.
+ Bracts at base of pedicels never with a recurved appendage. . . . . 11.
11. Ovary pyriform or obovoid, narrowed toward base; flowers erect, sky-blue (W. Caucasus and S. Transc.) . . . . 7. S. Winogradowi Sosn.
+ Ovary ovoid or globose, not narrowed toward base. . . . . 12.
12. Racemes loose, many-flowered (up to 6 flowers), flabby. . . . . 13.
+ Flowers solitary or raceme few-flowered (up to 3 flowers) . . . . . 14.
13. Flowers dark violet; bracteoles acute, to 2–4 mm long; perianth segments oblong-elliptic (E. Transc., Tal.). . . 11. S. caucasica Miscz.
+ Flowers pale azure; bracteoles obtuse, 1–1.5 mm long; perianth segments narrow (S. Transc.) . . . . . 9. S. diziensis Grossh.
14. Perianth pale-colored as a rule, pale azure to nearly white . . . . . 15.
+ Perianth bright-colored as a rule, dark azure or blue . . . . . 16.
15. Flowers pale azure, solitary or in racemes of 2 or 3; perianth segments obtusish, 12–15 mm long; bracts acutely lanceolate, to 4 mm long (W. Transc.) . . . . . 12. S. monanthos C. Koch
372 + Flowers erect, white or pale azure, commonly in racemes of 2–4, rarely solitary; perianth segments 10–12 mm long; bracts very small, obtusish (Nakhichevan SSR) . . . . . 14. S. Misczenkoana Grossh.
16. Scape up to 10 (15) mm long, monanthous; perianth bright blue (S. Transc.) . . . . . 13. S. armena Grossh.
+ Scape mostly 2- or 3-flowered; rarely monanthous; usually larger plants (European part of the USSR, Crimea, Caucasus) . . . . . 10. S. sibirica Andrevs.

Subgenus **EUSCILLA** Baker in Saund. Ref. Bot, III. App. 4 (1870) 5.— Perianth segments free from base; stamens inserted at base of perianth segments, uniseriate.

Section BARNADIA (Lindl.) Grossh.— Barnadia Lindl. Bot. Reg. (1826) tab. 1029, pro gen.— Ovary cells 1-ovuled.

1. S. **japonica** (Thunb.) Baker in Journ. Linn. Soc. XIII (1873) 233.— Ornithogadum japonicum Thunb. Fl. jap. (1784) 137.— Barnadia japonica Schult., Syst. VII (1829) 555; Kunth., Enum. IV (1843) 337.

Perennial; bulb ovoid, 15–25 mm long, covered with dark gray coats; leaves 2–8, appearing together with flowers, one-third to one-half the length of scape, fleshy, narrowly linear, 3–4 mm broad, attenuate toward apex; scape erect, firm, 25–40 cm long; inflorescence a dense many-flowered raceme, 8–12 cm long, 2 cm across; bracts, small, linear, acute, much shorter than pedicel; pedicels slender, 4–8 mm long, equaling or slightly longer than flower, horizontally spreading in fruit; flowers small, wide open, rose-purple; perianth segments 2–3 mm long, oblong; stamens

about the length of perianth; filaments triangularly dilated at base; capsule ovoid-oblong. July-August. (Plate IX, Figure 17).

Grassy slopes.— Far East: Uss. **Gen. distr.**: Japan. Described from Japan. Type in London.

Section **PROSPERO** (Baker) Grossh.— Ovary cells 2-ovuled.

Cycle **Vernales** A. Grossh.— Flowers in fall; bracts solitary.

2. **S. atropatana** Grossh. sp. nova in Addenda III, p. 740, (Table XLIV, Figure 3a-d).

Perennial; bulb ovaloid, ca. 15 cm long, 8-10 mm broad; scape slender, 10-20 cm long; leaves 2, greatly exceeding the scape, narrowly linear, 2-3 mm broad; raceme oblong, 10-20-flowered; scape often bifid; bracteoles small, obtuse; pedicels slender, 5-10 mm long, twice the length of flower; flowers only slightly open; perianth long; segments oblong-linear,
373 ca. 2 mm broad, obtusish, pale azure; stamens slightly shorter than perianth; capsule obovoid-cordate, 3-valved, deeply furrowed between the valves, short-beaked at the top. April.

Dry gravelly and stony slopes in the lower mountain zone.— Caucasus: S. Transc. (Nakhichevan SSR: Shakhbuz, Shakhtakhty, Dzhul'fa, Darry-dag, Ordubad). Endemic (possibly occurring in N. Iran). Described from Nakhichevan SSR. Type in Baku.

Cycle **Autumnales** Grossh. in Mon. Jar. d. Bot. Tifl. ser. II, 3 (1927) 184.— Flowering in fall; bracts solitary or none.

3. **S. autumnalis** L. Sp. pl. (1753) 443; Ldb. Fl. Ross. III, 156; Boiss. Fl. Or. V (1884) 224; Shmal'g., Fl. II, 498. — Ic.: Curtis, Fl. Londin. (1777) tab. 129, ed. II, v. IV (1835); Redouté, Liliaceae, tab. 317; Bot. Mag. t. 919; Rchb. Ic., Fl. Germ. (1848) tab. 1012.— Exs.: Fl. Exs. Austro-Hung. No. 1041; Herb. Fl. Cauc. No. 362 (1916).

Perennial; bulb ovoid, to 2-2.5 cm across, with pale brown or reddish-brown coats; scape 5-15 (20) cm long; leaves 5-6, after flowers, narrowly linear, canaliculate, erect, much shorter than scape; raceme densely many-flowered (containing 6-20 or more flowers), at first corymbose, later becoming drawn out; bracts none; pedicels obliquely ascending, equaling or longer than flower, ca. 7 mm long; flowers wide open, subrotate; perianth segments rounded-ovate, 4-5 mm long, reddish-violet; stamens half the length of perianth segments; capsule turbinate-obovoid, 3-furrowed, ca. 3 mm long. August-October. (Plate IX, Figure 16).

Scrub and grassy slopes.— European part: Bl., Crim.; Caucasus: Cisc., W. and E. Transc., Tal. **Gen. distr.**: Centr. Eur., Atl. Eur., W. Med., E. Med., Bal.-As. Min. Described from S. Europe. Type in London.

Section PLURIOVULATAE Grossh. — Ovary cells 4–10-ovuled.

Cycle **Bifoliae** Grossh. in Monit. Jard. Bot. Tifl. ser. II, 3 (1927) 185. — Flowering in fall; ovary cells 6-ovuled; bracts solitary; seeds arillate.

4. **S. bifolia** L. Sp. pl. (1753) 443; Ldb. Fl. Ross. IV, 156; Boiss. Fl. or. V, 227; Shmal'g., Fl. II, 499. — Ic.: Bot. Mag. tab. 746; Redouté, Liliacée, tab. 254; Rchb. Ic. Fl. Germ. (1848) tab. 1015. — Exs.: Fl. Exs. Austro-Hung. No. 3906; HFR No. 84 (1898).

Perennial; bulb ovoid, to 2 (3) cm across, the coats dark gray, rosy within; scape 10–20 (to 40) cm long; basal leaves 2, rarely 3, broadly linear, long-sheathing, the relatively short blade recurved and commonly
374 obtuse; inflorescence second, corymbose due to lower pedicels being much longer than the upper, 2–5 (to 10)-flowered; bracts none or obsolescent; flowers wide open, sky-blue, rarely purplish-azure or whitish; sometimes flowers, pedicels and the upper part of scapes purplish-violet (v. purpurea Miscz.); perianth segments oblong, obtuse, 5–12 mm long; stamens slightly shorter than perianth; capsule turbinate, obtusely 3-angled; 7–10 mm long. March-April. (Plate IX, Figure 14).

Wood margins, scrub, and grassy slopes. — European part: U. Dnp., M. Dnp., Bl., Crim.; Caucasus: Cisc., W. Transc. **Gen. distr.**: Centr. Eur., W. Med., Bal.-As. Min. Described from Centr. Europe. Type in London.

5. **S. nivalis** Boiss. Diagn. Ser. I, V (1844) 63. — S. bifolia β nivalis Boiss., Fl. Or. V (1884) 227. — S. minor and S. dubia C. Koch in Linnaea XIX (1847) 315.

Perennial; bulb ovoid, 1–1.5 cm broad, with dark gray coats; scape 3–8 cm long; leaves narrowly linear, to 6 mm broad, short; inflorescence 1–3-flowered; pedicels unequal, always subtended by small white bracteoles; flowers pale azure to nearly white; perianth segments linear-oblong, 6–7 mm long; stamens slightly shorter than perianth segments. May-June.

High-mountain meadows, at 1800–3000 m. — Caucasus: W. Transc. **Gen. distr.**: Bal.-As. Min. Described from Greece. Type in Geneva.

Cycle **Rosenianae** Grossh. in Monit. Jard. Bot. Tifl. II, 3 (1927) 186. — Flowering in spring; ovary obovoid or pyriform; ovary cells 6-ovuled; bracts 2, united.

6. **S. Roseni** C. Koch. in Reise n. d. Kauk. Isthm. II, 368 (nomen) et in Linnaea XXII (1849) 250. — S. cernua var. uniflora Som. et Lev. in A.H.P. XVI (1900) 426. — S. Koenigi Fomin in Monit. Jard. Bot. Tifl. XIII (1908) 19. — S. macrantha E. Bordz. A.H. Jur. XI (1910) 32. — S. cernua Boiss. Fl. Or. V (1884) 226 p.p. — Ic.: Miscz., Tr. Byuro po prikl. bot., 2 (1912). — Exs.: Herb. Fl. cauc. No. 115.

Perennial; bulb large, ovoid, to 3 cm long and 2–2.5 cm across, with dark gray coats; scape 10–30 (40) cm long, monanthous or terminating in several flowers; leaves 2 or 3, shorter than scape, broadly linear,

3–8 (to 20) mm broad, pale green, lustrous, cucullate; bracts small, white, cordate at base, toothed or truncate at apex; pedicels shorter than flower; flower large; perianth segments 20–25 (to 30) mm long, oblong, obtuse, recurved, pale azure or whitish, paler in lower part, with a darker band on the back; stamens half the length of perianth; style longer than ovary. May-June. (Plate IX, Figure 11).

375 High-mountain meadows. — Caucasus: W. and S. Transc. Gen. distr.: Bal.-As. Min. (Asia Minor), Arm.-Kurd. Described from Asia Minor. Type in Berlin.

7. S. **Winogradowii** Sosn. in Monit. Jard. Bot. Tifl. 33 (1914) 3. — S. Roseni var. pulchella Miscz., Tr. Prikl. Bot. 2 (1912) 46 p.p. — S. cernua Radde Mus. Cauc. II (1901) 164 p.p. — S. cernua var. grandiflora Trautv. in A.H.P. V (1878) 479.

Perennial; bulb ovoid, to 2 cm long and to 15 mm across, with dark gray coats; scape 10–30 cm long, rather weak, bearing 1 or more often several flowers; leaves oblong-linear to oblong-lanceolate, 5–10 mm broad, pale green, cucullate; bracts small, connate, thickened at base, toothed or obliquely truncate at apex; perianth segments 14–17 mm long, oblong-lanceolate, pale azure, sometimes slightly violet-tinged, dark-colored on the nerve, obtusish to acutish; stamens about half the length of perianth segments; ovary obovate. June-July. (Plate IX, Figure 13a).

High mountain meadows, near melting snow. — Caucasus: W., E. and S. Transc. Gen. distr.: Arm.-Kurd. (former Artvin District). Described from Georgia. Type in Tiflis.

Cycle **Hohenackerianae** Grossh. in Monit. Jard. Bot. Tifl. II, 3 (1927) 190. — Flowering in spring; ovary cells 6-ovuled; bracteoles 2, distinct, appendaged, recurved.

8. S. **Hohenackeri** Fisch. et Mey. in Hohenacker, Enum. Talysh. (1838) 26; Boiss. Fl. Or. V, 227. — S. cernua var. pluriflora Ldb. Fl. Ross. IV (1853) 157.

Perennial; bulb ovoid to subglobose-ovoid, to 2 cm long and as much across; scape (10)–20–40 cm long, weak; leaves 4 or 5, slightly shorter than to exceeding the scape, linear-lanceolate, 3–10 (12) mm broad, slender; inflorescence a loosely 4–8-flowered raceme; bracts 2, linear, with a recurved subulate appendage; pedicels equaling or slightly longer than flowers; perianth segments lilac-azure, oblong-lanceolate, obtusish, 12–13 (15) mm long; stamens about half the length of perianth; style slender, slightly exceeding the ovary; ovary and capsule flattened subglobose-ovoid. March-April. (Plate IX, Figure 12 a, b).

Woods, scrub, and wood margins, to 500–600 m. — Caucasus: E. Transc. (Akhsu in Shemakha District), Tal. Gen. distr.: Iran (Gilan, Mazanderan, Astrabad). Described from Talysh. Type in Leningrad.

Cycle **Sibiricae** Grossh. in Monit. Jard. Bot, Tifl. II, 3 (1927) 191. — Flowering in spring; bracts 2, sometimes united; ovary cells 4–10, mostly 6.

376 9. S. **diziensis** Grossh. in Monit. Jard. Bot. Tifl. II, 3 (1927) 191.

Perennial; bulb ovoid, 2 (to 4–5) cm long and 1.5 cm across, with gray coats; scape flabby, 15–32 cm long; leaves 2–5, thin, broadly oblong-linear, flat, 16–28 mm broad, equaling the scapes, subobtuse to subacute, not cucullate; raceme loosely 2–4-flowered; bracts 2, small, often united, to 1.5 mm long, obtuse, not appendaged; pedicels slender, 2–3 times the length of flowers; perianth segments 13–16 mm long, pale azure, nearly white, with a darker band on the back, oblong-linear, obtuse; stamens one-third the length of perianth; capsule globose. April.

In fissures and under rock overhangs in the lower mountain zone. — Caucasus: S. Transc. (Nakhichevan SSR: Negram, Ordubad, Akulisy). Described from N. Iran (Maku, Diza). Type in Tiflis.

10. S. **sibirica** Andrevs, Botan. Repository V (1804) tab. 365. — S. c e r n u a Ldb. Fl. Ross. IV. (1853) 157; Boiss. Fl. Or. V, 226 p. p.; Shmal'g., Fl. II, 494. — S. a z u r e a Goldbach Mém. Soc. Nat, Mosc. V (1817) 125 (nomen). — Ic.: Andrevs, l. c. tab. 365; Redouté, Liliacées, III (1807) tab. 130 (sub S. a m o e n a); Ib. tab. 298 (sub S. c e r n u a); Bot. Mag. tab. 2408 (sub S. a m o e n u l a); Syreishch. Ill. Fl. Mosk. gub. I (1906) 241 (sub S. c e r n u a); Fl. Yugo.-Vost. (1929) 385, f. 188. — Exs.: HFR No. 188, sub S. c e r n u a.

Perennial; bulb ovoid, to 2 cm long and to 15–20 cm across, covered with dark gray coats; scapes angled, flattened, 10–20 (30) cm long, 1–4 from a single bulb, bearing 1–4 nodding flowers; leaves 2–4, broadly linear, 10–20 mm broad, enlarged toward apex, subacute, cucullate, shorter than to nearly equaling the scapes; bracteoles small, white; pedicels equaling or shorter than the flowers; perianth segments 12–13 mm long, oblong-linear, obtusish, sky-blue with a darker band on the back, rarely almost white; stamens one-half to two-thirds the length of perianth; anthers blue; ovary ovoid-globose; capsule subglobose. In the Caucasus the plants are mostly shorter, with narrower and little enlarged leaves, and more intensely colored perianth — var. g r a c i l i s Grossh. March-April. (Plate IX, Figure 15 a).

Broad-leaved woods, wood margins, and scrub. — European part: Lad.-Ilm. (rare, naturalized), U. V. (rare, naturalized), U. Dnp., M. Dnp., V.-Don, Bl., Crim., L. Don; Caucasus: Cisc., Dag., Tal., E. Transc. **Gen. distr.**: Centr. Eur., Bal.-As. Min. (Balkans). Probably described from the southern part of the USSR (erroneously reported for Siberia). Type in London.

11. **S. caucasica** Miscz. in Tr. Byuro po Prikl. bot. 2 (1912) 48 and 56; Grossh. in Monit. Jard. Bot. Tifl. sér. II, 3 (1927) 197.

377 Perennial; bulb ovoid, to 2 cm long and 10–15 mm across, with gray coats; scape to 20 cm long, solitary or several from a single bulb; leaves 2–4, broadly linear, 10–15 mm broad, slightly shorter than the scape, cucullate; inflorescence usually a 3–6 flowered raceme, rarely flowers fewer or solitary; bracts acute, to 2–4 mm long, white-hyaline; pedicels commonly longer than flowers, slender, nutant after anthesis; perianth segments 10–12 mm long, oblong-elliptic, obtuse, bright azure suffused with violet; stamens one-half to two-thirds the length of perianth, with azure anthers; ovary subglobose-ovoid; capsule subglobose. March-April.

Woods in the lower and middle mountain zone. — Caucasus: E. Transc., Tal. Endemic. Described from Karabakh (Murob-dag). Type in Tiflis.

Note. A species differing little from S. sibirica, the distinguishing characteristics being chiefly the larger number of flowers and the tinge of a different color, which caused confusion with S. Hohenackeri. Additional field studies are needed.

12. **S. monanthos** C. Koch in Linnaea XXII (1849) 251; Grossh. in Monit. Jard. Bot. Tifl. ser. II, 3 (1927) 197. — S. cernua Boiss. Fl. Or. V (1884) 226 p.p. — S. sibirica var. tenuis Miscz. in schedis. — Exs.: Pl. or. exs. No. 376.

Perennial; bulb ovoid, ca. 2 cm long, 15–18 mm across, covered with gray coats; scapes 10–20 cm long, solitary or up to 4 from a bulb; leaves 2–5, linear to broadly linear, 4–10 mm broad, shorter than scapes; scapes bearing 1 or 2 flowers, rarely more; bracts relatively large, broadly lanceolate, white, obtusish to acutish, not appendaged; pedicels equaling or longer than flowers, strongly attenuate below the flower; perianth segments broadly lance-linear, 10–12 mm long, obtusish, pale azure to nearly white, with a darker band on the back; stamens about half the length of perianth; anthers azure; ovary ovoid, slightly narrowed toward base. March-April.

Woods of the lower and middle mountain zones. — Caucasus: W. Transc. Gen. distr.: Bal.-As. Min. (Lazistan, Pontus*). Described from Pontus.* Type in Berlin.

13. **S. armena** Grossh. in Monit. Jard. Bot. Tifl. ser. II, 3 (1927) 198. — S. sibirica f. monantha E. Bordz. in Fl. Cauc. exs. (1909) No. 334. — Exs.: l.c.; Pl. or exs. No. 355.

Perennial; bulb ovoid, to 20 cm long, with gray coats; scapes 8–15 (20) cm long; leaves 2, commonly falcately recurved, oblong-lanceolate, 2–5 mm broad, cucullate; flowers solitary or rarely 2; bracts
378 2, small; perianth segments elliptic-linear to oblong, 10–13 mm long, 3–5 mm broad, intensely blue, with a very dark dorsal band, rarely pale blue (var. pallida Troitz.); stamens about half the length of perianth; capsule ovoid-spherical, obtusely 3-angled. May-June.

Grassy slopes, at altitudes of 1500–2400 m. — Caucasus: S. Transc. (W. part). Gen. distr.: Arm.-Kurd. Described from S. Georgia. Type in Tiflis.

Note. Contrary to E.I. Bordzilovskii's view that this form is merely a variety of S. sibirica, the author is of the opinion that the distinctiveness of the distribution area, the nature of the habitat (not sylvestrine), and the constancy of characters as a whole, justify the establishment of this form as an independent species.

14. **S. Misczenkoana** Grossh. in Monit. Jard. Bot. Tifl. ser. II, 3 (1927) 200.

Perennial; bulb small, ovoid, 15–18 mm long, 10–15 mm across; bulb coats dark gray, violet within; scape slender, 4–10 cm long; leaves mostly 3 or 4, recurved, broadly linear, ca. 5 mm broad, shorter than the scape, green, not cucullate; flowers 2, rarely 1–4; bracts small,

* [Ancient region of NE Asia Minor.]

obtuse; pedicels erect, shorter than flowers; perianth segments 10–12 mm long, oblong-oval, obtuse, pale azure or nearly white, with a dark nerve on the back; stamens two-thirds the length of perianth; anthers dark azure. March-April-May.

Mountain meadows. — Caucasus: S. Transc. (Zangezur Range).
Gen. distr.: Iran. Described from Zangezur Range. Type in Tiflis.

Cycle **Puschkinioides** Grossh. — Inflorescence a raceme of several flowers; bracts 2, connate.

15. **S. puschkinioides** Rgl. in A.H.P. III (1875) 295; Izv. Obshch. lyub. est., antr. i etn. XXI, 2, 118; XIX, 9–10. — Exs.: H.F.A.M. No. 4 (1929).

Perennial; bulb ovoid, 10–20 cm long, covered with gray coats; leaves 2–5, broadly linear, 3–6 (10) mm broad, obtuse, more strongly narrowed toward base than toward apex; scape 10–20 cm long, rather weak; inflorescence a 2–8-flowered raceme; bracts unequal, small, one-third to one-half the length of pedicels; pedicels shorter to longer than flowers, erect; flowers pale azure, rarely brighter azure with a blue dorsal band; perianth segments linear-oblong, 10–12 mm long, acutish; stamens only slightly shorter than perianth; anthers oblong, blue; ovary ovoid; capsule flattened globose. April-May.

Slopes in the middle mountain zone. — Centr. Asia: Pam.-Al., T. Sh. Endemic. Described from Central Asia. Type in Leningrad.

379 16. **S. bucharica** Dessjatova in Fedch., Rast. Turk. (1914) 248, nomen.

Perennial; bulb ovoid, 10–20 cm long, covered with gray or dark brownish-gray; scape 10–20 cm long, rather weak; leaves 2 or 3, oboblong-spatulate, broadest at upper third, 12–25 mm long, abruptly narrowed toward apex, obtusely truncate and terminating in a small point; inflorescence a dense 5–10-flowered raceme; bracts white, much shorter than pedicels; pedicels shorter than, rarely equaling or longer than perianth; flowers only slightly open; perianth segments narrowly oblong, ca. 12 mm long and 2–3 mm broad, pale azure, with a darker median nerve; stamens two-thirds the length of perianth; anthers dark azure, oblong; capsule flattened-globose, small; seeds black, ovoid, minutely alveolate. April-May. (Plate IX, Figure 10).

Middle mountain zone, on dry slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Bukhara. Type in Leningrad.

17. **S. Raevskiana** Rgl. in A.H.P. VIII (1884) 655. — Ic.: Rgl. l.c., tab. VIII, f. e–h.

Perennial; bulb oblong-ovoid, 15–25 mm long, covered with gray coats; scape rather weak, 12–25 cm long; leaves 3–10, narrowly linear, 1.5–2 mm broad, weak, often flexuous, about equaling or slightly exceeding the scape; flowers 2 or 3, rarely solitary, erect, only slightly open; bracts small; perianth segments dark bluish-violet, with a green dorsal band, 14–16 (18) mm long, oblong-lanceolate, attenuate toward apex; stamens slightly shorter than perianth, with dark blue anthers; ovary ovoid. March-April. (Plate IX, Figure 18).

Slopes in the middle mountain zone.— Centr. Asia: Pam.-Al. Endemic. Described from Bukhara. Type in Leningrad.

Genus 276. **ORNITHOGALUM** * L.**

L. Gen. pl., I(1737)95; Baker in Journ. Linn. Soc. XIII (1873) 257–285.

Perianth segments of medium size, rather wide, many-nerved, white, commonly with a green dorsal band of varying breadth, or rarely the segments yellowish; filaments of stamens flat, petaloid, bicuspidate at apex, narrower on the sides or toward apex; anthers dorsifixed; style filiform with triangular stigma; capsule with winged or wingless ribs;
380 seeds flat, ovoid or subglobose, black; inflorescence a raceme or a corymb; scape leafless; leaves radical; bulb of numerous small united coats.

1. Filaments broad, petaloid, cuspidate, the anthers inserted between the cusps (Section Myogalum Baker) . . . . . 2.
+ Filaments not cuspidate, narrowed at apex to a point . . . . . 3.
2. Filaments bearing on the inner side below the anthers a small tooth decurrent into a rather broad wing . . . . 24. **O. Boucheanum** Aschers.
+ Filaments smooth on the inner side . . . . . 23. **O. nutans** L.
3. Inflorescence an elongated many-flowered cylindric raceme (often pyramidal when young); leaves mostly shorter than inflorescence (Section Beryllis Baker) . . . . . 4.
+ Inflorescence a corymb or a short raceme, relatively few-flowered; leaves often exceeding the inflorescence, sometimes 2–3 times as long; smaller plants with a weak scape (Section Heleocharmos Baker) . . . . . 10.
4. Perianth segments with a rather broad green dorsal band, sometimes turning brown in herbarium specimens . . . . . 6.
+ Perianth segments without continuous, rather broad dorsal band, white or rarely with several ferruginous or greenish nerves . . . . . 5.
5. Perianth segments always pure white on the back; rather tall plants (50–80 cm); inflorescence 20–45 cm long, many-flowered; pedicels arcuately ascending after flowering . . . . . 19. **O. arcuatum** Stev.
+ Perianth segments white on the back or with several ferruginous or obsolescent greenish nerves; scape on the average 20–35 cm (rarely up to 70 cm) long; pedicels obliquely ascending after flowering and more or less appressed to scape . . . . 22. **O. Fischerianum** H. Krasch.
6. Perianth segments greenish-yellow on the margin . . . . . 16. **O. flavescens** Lam.
+ Perianth segments white-margined . . . . . 7.
7. Pedicels divergent after flowering and characteristically arcuate-ascending, the mature capsule thus erect . . . . . 8.
+ Pedicels straight after flowering, obliquely ascending and more or less appressed to scape . . . . . 9.
8. Scape to 1 mm long; inflorescence 20–25 cm long, many-flowered; leaves lance-linear, 3–4 cm broad, short-acuminate . . . . . 20. **O. magnum** H. Krasch. et Schischk.
381 + Smaller plants (40–60 cm tall; leaves linear, rather long-acuminate, to 1 cm broad . . . . . 17. **O. Schelkovnikovii** Grossh.

* A plant name mentioned by Dioscorides, from Greek ornis, bird, and gala, milk.

** Arranged by I.M. Krashennikov.

9. Inflorescence 10–25 cm long, many-flowered; pedicels 2–3 times as long as bracts; leaves smooth-margined . . . . . 18. O. pyrenaicum L.
+ Inflorescence to 10 cm long, few-flowered (10–20 flowers); pedicels half as long again to twice as long as bracts; leaves distantly denticulate . . . . . 21. O. brachystachys C. Koch.
10. Leaves more or less pubescent beneath . . . . 4. O. fimbriatum Willd.
+ Leaves glabrous. . . . . 11.
11. Mature capsules with prominently winged ribs. . . . . 12.
+ Mature capsules not distinctly winged . . . . . 17.
12. Lower pedicels much longer than the upper ones, hence lower flowers markedly overtopping the upper . . . . . 7. O. Woronowii H. Krasch.
+ Lower pedicels little differing in length from the upper ones; fruiting pedicels often rather strongly arching . . . . . 13.
13. Fruiting pedicels very strongly twice curved (S-shaped), conspicuously clavately thickened above the curvature . . . 10. O. sigmoideum Freyn.
+ Fruiting pedicels straight or more or less curved, not thickened or relatively little thickened at the curvatures. . . . . 14.
14. Leaves spatulate-linear, narrowed toward base, 6–10 mm broad, usually slightly exceeding the inflorescence . . . 8. O. Balansae Boiss.
+ Leaves lance-linear or linear, 2–5 mm broad, commonly half as long again to 3 times as long as inflorescence . . . . . 15.
15. Scapes 15–20 cm long; fruiting pedicels straight or weakly arching; leaves shortly obtusish; perianth segments to 25 mm long. . . . . 11. O. Schischkini H. Krasch.
+ Scapes 5–10 cm long; fruiting pedicels rather strongly arcuately ascending; leaves more or less long-acuminate; perianth segments to 20 mm . . . . . 16.
16. Leaves reaching 2–3 times the height of inflorescence, deeply canaliculate. . . . . 6. O. Sintenisii Freyn.
+ Leaves flat, equaling or not more than twice as long again as scapes; plants of the alpine zone . . . . . 9. O. Schmalhauseni N. Alb.
382 17. Leaves elliptic-lanceolate or broadly linear, from 10 to 20 mm broad, shorter than to slightly exceeding the inflorescence . . . . . 18.
+ Leaves narrower, narrowly linear, commonly less than 10 mm broad, often 2–3 times the length of inflorescence (rarely shorter). . . . . 21.
18. Inflorescence 2–6-flowered . . . . . 19.
+ Inflorescence containing more flowers . . . . . 20.
19. Perianth segments 12–15 mm long; leaves long-elliptic . . . . . 13. O. graciliflorum C. Koch.
+ Perianth segments 22–25 mm long . . . . . 12. O. hyrcanum Grossh.
20. Perianth segments oblong-lanceolate, 12–18 mm long . . . . . 14. O. platyphyllum Boiss.
+ Perianth segments oblanceolate, broader (to 5 mm broad in upper part), 20–25 mm long . . . . . 15. O. arianum Lipsky.
21. Fruiting pedicels very strongly arching, hence the capsule vertical; leaves 2–3 times the length of inflorescence . . . . 3. O. refractum Kit.
+ Fruiting pedicels straight or slightly arching, horizontal or obliquely ascending . . . . . 22.
22. Capsule ribs evenly distributed; pedicels long, horizontally spreading in fruit . . . . . 1. O. umbellatum L.

\+ Capsule ribs in approximate pairs . . . . .23.
23. Bulb ovoid, gray-coated; inflorescence 5–15-flowered; leaves narrowly linear, often drying at flowering; steppe plants . . . . 2. **O. tenuifolium** Guss.
\+ Bulbs oblong-ovoid, dark brown-coated; inflorescence weak, 2–5-flowered; leaves delicate, flat, green at flowering; plants of steppe mountain slopes of Transcaucasia . . . . 5. **O. transcaucasicum** Miscz.

Section HELEOCHARMOS Backer in Journ. Linn. Soc. XIII, 262.— Characteristics in the key.

1. **O. umbellatum** L. Sp. pl. (1753) 307; Ldb. Fl. Ross. IV, 159 ex p. Shmal'g., Fl. II, 500.

Perennial; bulb small, ovoid, often with small bulbils; leaves linear, 4–8 mm broad, canaliculate, sometimes white-banded beneath, commonly exceeding the scape; inflorescence many-flowered; lower pedicels subhorizontally spreading in fruit, much longer than the narrow bracts; perianth segments linear-oblong, obtuse, slightly acuminate, with a broad green median band; stamens half the length of perianth segments; capsule
383 oblong-ovoid, equidistantly 6-ribbed, with a small depression at top due to raised projections. June.

Woods and glades.— European part: M. Dnp.. **Gen. distr.**: Scand., Atl. Eur., W. Med., Bal. As. Min. Described from Europe.

2. **O. tenuifolium** Guss. Prodr. fl. sic. 1 (1827) 413.—O. Gussonii Ten. Fl. Neap. III, 337; Ldb. Fl. Ross. IV, 160; Shmal'g., Fl. II, 500.— Ic.: Ten. Fl. Neap. t. 226; f. 1; Rchb. Ic. Fl. Germ. t. 1020.

Perennial; bulb ovoid, small; leaves 4–6, narrowly linear, sometimes faintly light-nerved beneath, shorter to longer than the scape, sometimes withering at flowering; inflorescence containing 5–15, rarely fewer flowers; lower pedicels remaining upturned in fruit, usually longer than the narrow bracts; perianth segments oblong-linear, to 1.5 cm long, green-banded beneath, the outer broader and obtuse, the inner narrower and more pointed; capsule obovoid, the 6 archingly convex ribs arranged in approximate pairs, projecting at the top, thus forming a marked depression at the top. May. (Plate XXII, Figure 6).

Steppes, stony slopes, and meadows.— European part: M. Dnp., Bl., U. Don, L. Don; Caucasus: Cisc., Dag., E., S. and W. Transc. **Gen. distr.**: W. Med., Bal.-As. Min., Arm.-Kurd. Described from Sicily.

3. **O. refractum** Kit. in Willd. Enum. pl. H. reg. berol., 1813, Suppl. 18; Ldb. Fl. Ross. IV, 160.—Ic.: Rchb. Ic. Fl. Germ. t. 1024.

Perennial; bulb ovoid, included with numerous bulbils in a common coat; scape not more than 10 cm long; leaves narrowly linear, 3–5 mm broad, white-banded beneath, reaching up to 3 times the height of inflorescence; pedicels long, in fruit slightly recurved at base, then abruptly vertical; perianth segments oblong-elliptic to lanceolate, 1.5–2 cm long, obtusish, broadly green-banded beneath; stamens half the length of perianth segments; capsule oblong-ovoid, the ribs in approximate pairs, very slightly ribbed. April.

Scrub and steppe slopes. — European part: Centr. Eur. (S.), Bal.-As. Min.

4. **O. fimbriatum** Willd. N. Schr. Ges. naturf. Freunde Berlin III (1801) 420. — O. Roegnerianum C. Koch in Linnaea, XXII (1849) 246.

Perennial; bulb ovoid, small, 1.5 cm in diameter; leaves 3–8, linear,
384 3–5 mm broad, canaliculate, often falcately recurved, considerably exceeding the scape, 10–28 cm long, rather densely covered beneath with long spreading white hairs (sometimes the leaves glabrous or nearly so except for the margin — v. ciliatum Boiss.); scape 5–12 cm long, commonly covered with spreading white hairs; inflorescence 1–10-flowered; pedicels 6–20 cm long, shorter to longer than the bracts, arcuately ascending in fruit; perianth segments 13–18 mm long, oblong-linear, obtuse or slightly acuminate, broadly green-banded on the back; stamens half the length of perianth; capsule with slightly winged paired ribs, 10–12 cm long. April.

Light woods, glades, and steppes. — European part: Crim., Bl. **Gen. distr.**: E. Med., Bal.-As. Min. Described from the Crimea (Chatyr-dag). Type in Berlin.

5. **O. transcaucasicum** Miscz. in Grossgeim, Fl. Kavk. I (1928) 230.

Perennial; bulb ovoid, small, to 1 cm in diameter, with dark coats; scape slender, weak, 10–12 cm long; leaves flat, delicate; 2–3 mm broad, 9–15 cm long, considerably exceeding the inflorescence; inflorescence 2–4-flowered; pedicels 1–2 cm long, shorter than to as long as the lanceolate bracts; perianth segments oblong-obovate, 9–11 mm long, obtuse, sometimes short-mucronate, rather broadly green-banded on the back. June-July.

Grassy mountain slopes. — Caucasus: S. Transc. Endemic. Described from Armenia (Lake Sevan). Type in Tiflis.

6. **O. Sintenisii** Freyn in Bull. Herb. Boiss., 2 sér., II (1902) 911–13.

Perennial; bulb ovoid to ovoid-globose; leaves few, lance-linear to linear, deeply canaliculate, recurved, reaching 2–3 times the height of inflorescence, 2–4 mm broad; scape 5–12 cm long, bearing 2–4 flowers, fruiting pedicels arcuately ascending, longer than the lanceolate bracts; perianth segments oblong-lanceolate, white, broadly green-banded beneath, 15–20 mm long, short-acuminate, sometimes mucronate; stamens half the length of perianth segments; capsule with obtuse ribs in closely approximate pairs. June.

Scrub and meadows. — Caucasus: Dag., E. Transc., Tal. **Gen. distr.**: Iran. Described from N. Persia. Type in Vienna; cotype in Leningrad.

7. **O. Woronowii** H. Krasch. sp. nova in Addenda III, p. 743.

Perennial; bulb ovoid, small; leaves linear, 4–7 mm broad, 20–25 cm
385 long, narrowly white-banded beneath, shorter to slightly longer than inflorescence; inflorescence 4–8-flowered, rarely containing up to 12 flowers, in a loose corymb; lower pedicels arcuately ascending at base, erect, at first equaling and at length greatly exceeding the upper, reaching up to 10 cm in length; bracts narrowly lanceolate, 1–4 cm long; perianth segments oblong-obovate to ovate-lanceolate, softly mucronate, 12–15 mm

long, broadly green-banded on the back; capsule ovoid, 6–7 mm long, the narrow winged angles approximate in pairs, forming a depression at the top. April-June. (Plate XII, Figures 1, 2).

Woods and fields.— European part: Crim.; Caucasus: Cisc. (W. part), W. Transc. Endemic. Described from vicinity of Sukhumi. Type in Leningrad.

8. **O. Balansae** Boiss. Fl. Or. V (1884) 222.

Perennial; bulb small (1 cm in diameter), ovoid; scape slender, 5–10 cm long; leaves 2 or 3, linear, ligulate, short-acuminate, rather strongly falcately recurved, canaliculate, ca. 6–10 mm broad, 7–15 cm long, equaling or exceeding the inflorescence; inflorescence 2- or 3-flowered, rarely 5–7-flowered, corymbose; flowering pedicels erect, closely approximate; lower fruiting pedicels slightly elongated; bracts lanceolate, commonly exceeding the pedicels; perianth segments 17–20 mm long, oblong-linear, obtuse, the outer slightly acuminate, broadly green-banded on the back; filaments strongly dilated, shortly narrowed at apex; capsule ovoid, the wings in approximate pairs. June. (Plate XXII, Figure 5, 5a).

Mountain and alpine meadows.— Caucasus: Cisc., W., E. and S. Transc. **Gen. distr.**: Bal.-As. Min., Arm.-Kurd. Described from the alpine zone of Pontus (Asia Minor). Type in Geneva.

9. O. Schmalhauseni N. Alb. Tr. Odessk. otd. Ross. obshch. sadovod. (1891) 15.— O. Balansae var. stenophyllum N. Alb. in Bull. Herb. Boiss., I, No. 5 (1893) 260.— Ic.: Al'bov, l.c.

Perennial; bulbs small, ovoid, with dark brown coats; scapes slender, weak, 4–10 cm long; leaves few, flat, narrowly linear to linear, 3–5 mm broad, rather strongly pointed at both ends, straight or arcuately recurved, equaling to half as long again as the scape, 6–20 mm long; inflorescence 1–3-flowered, rarely containing up to 8 flowers; pedicels slender, at first short and more or less erect, at length much elongated (3–5 cm), more or less arcuately upturned and greatly exceeding the lanceolate bracts; fruiting pedicels sometimes slightly thickened at apex and at curvature; perianth segments 10–15 mm long, oblong-lanceolate, obtusish, broadly green-banded beneath; capsule subglobose, the wings in approximate pairs. June-July.

386 Alpine and subalpine meadows.— Caucasus: W., S. and E. Transc. Endemic. Described from Abkhazia. Type in Leningrad.

10. **O. sigmoideum** Freyn et Sint. Bull. Herb. Boiss. t. IV (1896) 189.

Perennial; bulb small, ovoid-globose, 2 cm long, brown-coated; scapes slender, short; leaves linear or spatulate-linear, broadly canaliculate, white-banded beneath, cucullate, twice the length of scape or longer, 3–6 mm broad; fruiting pedicels strongly twice arched (S-shaped), conspicuously clavately thickened above the base; perianth segments ca. 2 cm long, oblong, obtuse, green-banded below; capsule ellipsoid, 8–9 mm long, the angled winged in upper part. June. (Plate XXII, Figure 7).

Alpine meadows.— Caucasus: S. Transc. **Gen. distr.**: Arm.-Kurd. Described from Turkish Armenia. Type in Vienna, cotype in Leningrad.

Plate XXII

1. Ornithogalum Woronovii H. Krasch.– 2. Cross section of the capsule of O. Woronovii H. Krasch.– 3. O. Sintensii Freyn.– 4. Cross section of the capsule of O. Sintenisii Freyn.– 5. O. Balansae Boiss.; 5a) stamen of O. Balansae Boiss.– 6. O. tenuifolium Guss., flower.– 7. O. sigmoideum Freyn., pedicel.– 8. O. arianum Lipsky, perianth segments.– 9. Detail of outer perianth segments of O. arianum Lipsky from the back.– 10. O. platyphyllum Boiss., capsule.– 11. O. Bucheanum Aschers., filament of stamen.– 12. O. Bucheanum Aschers.– 13. O. flavescens Lam.– 14. O. pyrenaicum L., flower.– 15. Portion of inflorescence of O. pyrenaicum L. with mature capsules.– 16. Cross section of capsule of O. pyrenaicum L.– 17. Portion of inflorescence of O. arcuatum Stev. with mature capsules.

Note. In areas where O. Balansae Boiss., O. Schmalhauseni N. Alb., and O. sigmoideum Freyn. grow side by side, transitional forms are of frequent occurrence. In relation to the characteristics of the respective distribution areas, these forms may be regarded as geographical or partly ecological races of these species. Detailed observations in natural conditions are much needed.

11. **O. Schischkini** H. Krasch. sp. nova in Addenda III, p. 743.

Perennial; bulbs small, ovoid, 4–5 cm long; scapes 15–20 cm long, slender; leaves nearly flat, broadly linear, 2–5 mm broad, gradually narrowed toward base, to 30 cm long, subobtuse, rather markedly exceeding the inflorescence; inflorescence 2- or 3- (rarely 4)-flowered; pedicels slender, the outer arching, 1–3 cm long, usually considerably exceeding the hyaline lanceolate bracts, saccately clasping the pedicels at base, gradually attenuate toward apex; perianth segments 2–2.5 cm long,
389 lanceolate, rather narrowly green-banded on the back; capsule subglobose, the angles in approximate pairs; style to half as long again as the capsule. May.

Forest glades. — Caucasus: E. Transc. Endemic. Described from vicinity of village of Zargeran, in Azerbaijan. Type in Leningrad.

12. **O. hyrcanum** Grossh., Fl. Kavk. I (1928) 331.

Perennial; bulb small, ovoid; scape to 25 cm long; leaves 6–8, 20–30 cm long, slightly exceeding the inflorescence, flat, 10–18 mm broad, gradually narrowed toward base; inflorescence 2–6-flowered, dense, ovaloid, gradually becoming corymbiform due to elongation of lower pedicels; bracts lanceolate; perianth segments 20–32 mm long, ovate-oblong, obtuse, broadly green-banded on the back; capsule wingless, with evenly spaced angles. June.

Mountain woods. — Caucasus: Talysh. Endemic. Described from Talysh. Type in Leningrad.

13. **O. graciliflorum** C. Koch. in Linnaea XXII (1849) 248.

Perennial; leaves 2, long-elliptic, 10–20 cm long, narrowed at both ends, many-nerved, equaling the slender scape; inflorescence corymbose, loosely 3- or 4-flowered; pedicels erect, the lower elongated, 2–3 times the length of the narrowly lanceolate bracts; perianth segments lanceolate, 12–15 mm long, white, rather broadly green-banded on the back. June.

Meadows and scrub. — Caucasus: S. Transc. Gen. distr.: Arm.-Kurd. Described from Asia Minor (Hemsin and [?] Sber). Type in Berlin.

14. **O. platyphyllum** Boiss. Diagn. plant. or sér. I, No. 5 (1844) 65. — O. montatum var. platyphyllum Boiss. Fl. Or. V (1884) 217.

Perennial; bulb small, ovoid, 2 cm in diameter; leaves 2–4, flat, lanceolate, 1–2 cm broad, acuminate, sometimes falcately recurved, equaling or exceeding the inflorescence; scape 10–20 cm long, rather thick at base, firm; inflorescence 6–12-flowered, rather distinctly corymbose; lower pedicels long, obliquely ascending, 2–5 cm long; fruiting pedicels one-third to one-half the length of the lanceolate acuminate bracts, curved at the tops, hence the capsule erect; perianth segments oblong-lanceolate,

obtuse, the outer narrower, acuminate, all broadly green-banded on the back, 12–18 mm long, sometimes tipped by a short soft pointed projection; capsule obovoid, to 15 mm long in maturity, the angles winged at the top. May-July. (Plate XXII, Figure 10).

390 Steppe slopes. — Caucasus: S. Transc. **Gen. distr.**: Bal.-As. Min., Arm.-Kurd., Iran. Described from Asia Minor (Karia).

15. **O. arianum** Lipsky in Fedch., Fl. Turkm. II, 1931. — Ic.: l.c.

Perennial; bulb broadly ovoid, ca. 2 cm in diameter, covered with gray coats; leaves 4 or 5, green, broadly linear, 1–2 cm broad, terminating slightly below the top of the inflorescence, subobtuse; bracts hyaline, greenish on the back; inflorescence many-flowered, corymbose, finally elongating; pedicels spreading in fruit, to 5 cm long; perianth segments white within, green-banded on the back, 2–2.5 cm long, ca. 5 mm broad, oblanceolate, obtusish, the inner slightly narrower; stamens half the length of perianth segments, the filaments linear-lanceolate; capsule ovoid. (Plate XXII, Figures 8, 9).

Meadows. — Centr. Asia: Mtn. Turkm. (Kopet Dagh). Endemic. Described from Turkmenistan (Kushka).

Note. A species closely related to O. platyphyllum Boiss.; availability of more ample material may possibly lead to unification of the two species.

Section **BERYLLIS** Salisb. in Journ. Linn. Soc. XIII, 273. Characteristics in the key.

16. **O. flavescens** Lam. Fl. Franc. (1778) 277, tab. 232, f. 2. — O. sulfureum Schult. Syst. Veg. VII (1829) 518. — Ic.: Rchb. Ic. Fl. Germ., X, tab. 1027.

Perennial; bulb ovoid, 3–5 cm in diameter; leaves linear, coerulescent, narrowly linear, 2–3 mm broad, sometimes marcescent; scape slender, 25–60 cm long; inflorescence many-flowered, loose, 5–25 cm long; pedicels obliquely ascending, straight, the lower 1–3 cm long, several times the length of the small broadly lanceolate bracts, acuminate; perianth segments oblong-linear, 5–10 mm long, ca. 1 mm broad, yellowish, with a broad ferruginous-green dorsal band; capsule ovoid, to 1.5 cm long. June-July. (Plate XXII, Figure 13).

Fields, meadows, steppe slopes, and roadsides. — European part: Bl., Crim. **Gen. distr.**: Atl. Eur., W. Med., Bal.-As. Min. Described from W. Europe (France).

17. **O. Schelkovnikovii** Grossh., Fl. Kavk. I (1928) 228.

Perennial; bulb 1.5–2 cm long; scape 40–50 cm long; leaves few, green, long-acuminate, 3–10 mm broad; inflorescence 10–20-flowered; fruiting
391 pedicels arcuately upturned, 3–4 cm long; perianth segments oblong-linear, to 10 mm long, narrowly green banded beneath. June-August.

Alpine and subalpine meadows. — Caucasus: S. Transc. Endemic. Described from Armenia. Type in Tiflis.

18. **O. pyrenaicum** L. Sp. pl. (1753) 306. — O. narbonense auct. fl. Ross. — Ic.: Rchb. Ic. Fl. Germ. X, tab. 1028.

Perennial; bulb ovoid, 2–3 cm in diameter; leaves coerulescent, linear, canaliculate, cucullate, 5–7 mm broad; scape 30–70 cm long, exceeding the leaves; raceme many-flowered, 10–25 cm long, initially compact, becoming elongated-cylindric and loose in fruit; fruiting pedicels straight, more or less appressed to scape; occasionally pedicels arching and raceme containing fewer flowers; bracts lanceolate, long-acuminate, the lower one-third to one-half the length of pedicels; perianth segments oblong-lanceolate, 12–14 mm long, obtuse, white, rather broadly greenish-banded; stamens half the length of perianth segments; capsule ovoid, 3-angled, 1.5 cm long, with slightly convex valves. June-July. (Plate XXII, Figures 14, 15, 16).

Steppes, steppe slopes, arable land, and among field crops. — European part: Crim; Caucasus: Cisc., W., E. and S. Transc., Dag.

19. **O. arcuatum** Stev. in Mém. Soc. Nat. Mosc. VII (1829) 271.

Perennial; bulb large, to 2 cm in diameter; scapes firm, 5–8 mm in diameter, 50–80 cm long; leaves linear, to 10 cm [sic] broad, rather long-acuminate, 40–50 cm long; inflorescence large, many-flowered, 20–45 cm, long, initially densely pyramidal, becoming loosely cylindric; flowering pedicels 3–7 cm long, more or less straight, erect; fruiting pedicels arcuately upturned in lower part; bracts lanceolate, long-acuminate, one-third to one-half the length of pedicels; perianth segments 10–12 mm long, linear, obtusish, milky white, not green-banded and merely brownish-nerved, sometimes (in herbarium specimens) with a brownish spot above; stamens half the length of perianth, sometimes slightly longer; capsule pyramidal, 3-angled, strongly 3-lobed at the top, 1–1.5 cm long in maturity, the convex valves deeply concave at angles. June. (Plate XXII, Figure 17).

Mountain woods and steppe slopes. — Caucasus: Cisc. Endemic. Described from Ciscaucasia (grassy slopes in vicinity of Mount Beshtau). Type in Helsinki.

20. O. **magnum** Krasch. et Schischk. sp. n. in Addenda III, p. 743. — O. arcuatum Boiss. (non Stev.) in Fl. Or. V (1884) 215.

392 Perennial; bulb rather small, ovoid, to 2 cm in diameter; scapes firm, to 1 m long and to 6 mm in diameter; leaves broadly lance-linear, 2–4 cm broad, narrowed at base, short-acuminate; inflorescence large, many-flowered, cylindric, fairly loose, 20–25 mm [?] long; flowering pedicels to 4 cm long, more or less straight, obliquely ascending; fruiting pedicels arcuately ascending, hence the capsule erect; bracts lanceolate, one-fourth to one-third the length of pedicels; perianth segments oblong-linear, to 2 cm long, white, obtusish, mucronate, with brown median nerves; filaments broadly lanceolate, abruptly narrowed at apex, half the length of perianth; capsule ovoid, 12–13 mm in maturity, the somewhat convex valves concave at margins. June-July.

Woods, scrub, and vineyards. — Caucasus: Cisc., E. Transc. Endemic. Described from Ciscaucasia (Karas colony). Type in Leningrad.

Note. A plant worthy of attention with a view to introduction for ornament.

21. **O. brachystachys** C. Koch. in Linnaea, XXII, (1849) 74–75.

Perennial; bulb rather small, ovoid, 1.5–1.75 cm in diameter; scapes slender, 30–35 cm long; leaves few, narrowly linear, 3–5 mm broad; inflorescence narrow, 10–15 cm long, 10–25-flowered; pedicels 1–2 cm long, in fruit nearly appressed to rachis, slightly exceeding the lanceolate acuminate bracts; perianth segments oblong-linear, 10–12 mm long, obtuse, white, narrowly green-nerved on the back; capsule ovoid, 1 cm long, with slightly convex valves. July.

High mountain zone. — Caucasus: S. Transc. Endemic. Described from Armenia. Type in Leningrad.

22. **O. Fischerianum** H. Krasch. nom. nov. — O. brachystachys Fisch. (non C. Koch.) nom. nud., Cat. H. Gorenk. et pl. exs. in H. Inst. Bot. Ac. Sc. URSS. — O. narbonense var. minus Ldb. Fl. Ross. IV (1853) 158. — O. narbonense var. brachystachys Schmalh., Fl. II, (1897) 501. — Ic.: Fl. Yugo-Vost., Figure 190.

Perennial; bulb rather small, ovoid, 1.5–2.5 cm in diameter; scapes averaging 20–35 cm in length, occasionally to 70 cm long; leaves 4–6, shorter than the scapes, linear, canaliculate, 2–6 mm broad; inflorescence a loose oblong raceme, on the average 5–12 cm long (rarely to 20 cm); flowers averaging 4–25; flowering pedicels obliquely ascending; fruiting pedicels rather strongly appressed to scape, sometimes slightly arcuate, 1.5–2.5 cm long; bracts lanceolate to linear-lanceolate, long-acuminate, 1–2.5 cm long, commonly shorter than or rarely exceeding the pedicels;
393 perianth segments 10–12 mm long, oblong-linear, obtuse, white, with a narrow median band consisting of several ferruginous or faint greenish nerves; filaments slightly more than half the length of perianth, subulately acuminate; capsule slightly elongate to ovoid. May-June.

Steppes, sometimes alkaline, and meadows. — European part: Bl., L. Don, L. V., Transc.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp. (N.) Endemic. Described from the SE part of the European USSR. Type in Leningrad.

Section **MYOGALUM** Baker in Journ. Linn. Soc. XII, 272. — Characteristics in the key.

23. **O. nutans** L. Sp. pl. (1753) 308; Shmal'g., Fl. II, 500. — Myogalum nutans Link, Handb. I (1829) 164; Ldb. Fl. Ross. IV, 161. — Albucea nutans Rchb. Fl. Excurs. (1830) 110. — Ic.: Rchb. Ic. Fl. germ. X, tab. 483.

Perennial; bulb large, ovoid, ca. 3.5 cm in diameter, with numerous small bulbils; scape 30–45 cm long; leaves 4–6, broadly lanceolate, ca. 1 cm broad, slightly canaliculate, persistent in flower, equaling or slightly exceeding the inflorescence; inflorescence 3–12-flowers; bracts lanceolate, acuminate, to 3 cm long, about as long as pedicels; perianth segments oblong, to 2.5 cm long, to 8 mm broad, obtuse; outer filaments segments petaloid, short-acuminate, the inner with broad obtusish cusps, all without a tooth on the inner surface below the anther; capsule broadly ovoid. May.

Meadows and scrub. — European part: M. Dnp. Some of the locations refer perhaps to naturalized specimens of the cultivated plant, as this is

sometimes grown in E. Europe and easily runs wild. **Gen. distr.**: Scand., Atl. Eur., W. Med., Bal.-As. Min. Described from W. Europe.

24. **O. Boucheanum** (Kunth) Aschers. in Oesterr. Bot. Zeitschr. XVI (1866) 191; Pachoskii, Khersonsk. Fl. I, 466. — Myogalum Boucheanum Kunth. Enum. pl. IV (1842) 348. — Ic.: Hegi Ill. Fl. Mitt. Eur. II, f. 367 c and d.

Perennial; bulb ovoid, large; leaves linear, 8–15 mm broad, canaliculate, equaling or exceeding the scape, sometimes persistent at flowering; scape 20–50 cm long; inflorescence a fairly dense 1-sided raceme; perianth segments elongate-lanceolate, 20–25 mm long, acuminate, green-backed, with whitish margins; bracts lanceolate, more or less subulately long-acuminate, the lower to 3 cm long, considerably longer than the pedicels; anthers of inner stamens 3–4 mm long; filaments broadly
394 petaloid, all bicuspidate, the cusps of inner stamens equaling or exceeding, the anthers, those of outer stamens shorter, a small tooth on the adaxial side of filaments below the anthers decurrent into a winged process; capsule oblong, slightly longer than the style. May. (Plate XXII, Figures 11–12).

Scrub, river valleys and meadows. — European part: Bl., Crim. **Gen. distr.** Bal.-As. Min. Described from the Balkans.

Genus 277. **PUSCHKINIA*** ADAMS.**

Adams in Nova Acta Acad. Petr. XIV (1805) 164, tab. 13. — Adamsia Willd. Mag. Ges. Nat. Berl. (1808) 16.

Perianth campanulate, with a short tube and longer equal rotately spreading segments; anthers subsessile, dorsifixed, introrse, inserted at throat between the lobes of the 6-cleft crown formed by projections of the perianth; ovary sessile; style short, with capitate stigma; raceme loosely few-flowered.

1. Perianth tube campanulate, one-third to one-half the length of perianth segments . . . . . 1. **P. scilloides** Adams.
+ Perianth tube funnelform, slightly shorter than the segments . . . . . 2. **P. hyacinthoides** Baker.

1. **P. scilloides** Adams in Nova Acta Acad. Petrop. XIV (1805) 164; Grossg., Fl. Kavk. I, 231. — Adamsia scilloides Willd. Mag. Ges. Nat. Berl. (1808) 16. — Ic.: Bot. Mag. f. 2244. — Exs.: Pl. or. exs. No. 253.

Perennial; bulbs ovoid-globose; leaves 2 or 4, rather fleshy, linear-lorate, amplexicaul below, broadly linear, about equaling the slender scape, 10–30 cm long, 1 cm broad; raceme 1–6-flowered; pedicels slightly spreading, shorter than perianth; perianth azure; segments obtuse, 10–12 mm long, 3 times the length of the campanulate tube; crown one-third the length of perianth, 6-cleft down to base, the lobes entire or emarginate (rarely acutely bifid — var. libanotica Boiss.). April.

Mountain meadows and scrub. — Caucasus: Cisc., W. and E. Transc. **Gen. distr.**: N. Iran. Described from Transcaucasia.

* Named for A.A. Musin-Pushkin, who travelled in 1802 in the Caucasus and collected plants on the Ararat.

** Arranged by A.S. Lozina-Lozinskaya.

2. P. hyacinthoides Baker in Journ. Linn. Soc. XI (1871) 435; Grossg., Fl. Kavk. I, 231.

395 Perennial; leaves 2, rather fleshy, narrowly linear to lorate, amplexicaul at base, exceeding the scape; scape 5–15 cm long; raceme densely 4–6-flowered; pedicels short; perianth white or pale azure; perianth tube funnelform, slightly shorter than the segments; crown half the length of perianth, with emarginate to bifid lobes. April.

Dry mountain slopes, at 1800–2400 m, — Caucasus: E. Transc., Tal. **Gen. distr.**: N. Iran. Described from Kurdistan.

Genus 278. **BELLEVALIA*** LAPEYROUSE**

Lapeyrouse in Journ. Phys. LXVII (1808) 425.

Perianth tubular-campanulate; with more or less spreading but not reflexed segments and without constriction below the throat; filaments long, adnate in lower part to perianth tube; anthers apparently attached to throat, the tips reaching the margin of perianth or partly exserted; terminal flowers sometimes sterile; fertile flowers greenish, yellowish, violet, or blue, or turning from whitish-yellowish or lilac to various shades of brown; scapes firm, erect; inflorescence racemose; leaves lanceolate, mostly ciliate.

1. Flowers yellow, brown, greenish, blue, or violet; perianth long tubular-campanulate (Section Eubellevalia Boiss.) . . . . . 2.
+ Flowers blue; perianth short-tubular (Section Oxyodon A. Los.) . . 16.
2. Perianth of live plants blue or violet . . . . . 3.
+ Perianth brown, yellow, greenish, or purple . . . . . 4.
3. Perianth blue; anther violet . . . . . 1. **B. turkestanica** Franch.
+ Perianth dark violet; anthers pale azure . . . . . 2. **B. atroviolacea** Rgl.
4. Flowering pedicels 3 or more times the length of flowers . . . . . 5.
+ Flowering pedicels not more than twice the length of flowers . . . . . 6.
5. Pedicels 3 times the length of flowers, to 6 cm in fruit; scape to 20 cm long . . . . . 3. **B. albana** Woron.
+ Pedicels 4–8 times the length of flowers; to 12 cm in fruit; scape to 30 cm long . . . . . 4. **B. sarmatica** (Pall.) Woron.
6. Perianth zygomorphic, the lower segments longer than the upper . . . . . 5. **B. zygomorpha** Woron.
+ Perianth regular, with equal segments . . . . . 7.

396 7. Style exserted . . . . . 8.
+ Style included . . . . . 9.
8. Pedicels as long as flowers; leaves to 2 cm broad . . . . . 6. **B. longistyla** (Miscz.) Grossh.
+ Pedicels 2–3 times the length of flower; leaves to 4 cm broad . . . . . 7. **B. araxina** Woron.
9. Pedicels not elongating after anthesis; inflorescence narrowly cylindric . . . . . 10.
+ Pedicels elongating after anthesis; inflorescence narrower at top than at base . . . . . 12.

* Genus named for P.R. Belleval, founder of the Montpellier Botanical Garden (1598).

** Arranged by A.S. Lozina-Lozinskaya.— The species of the genus Bellevalia Lapeyr. are treated by the author on the lines established by Yu.N. Boronov, whose material and drawings have been used in the present study.

10. Flowers reddish; buds blue . . . . . 8. B. Aucheri (Baker) A. Los.
+ Flowers brownish; buds violet . . . . . 11.
11. Leaves much shorter than scape . . . . . 9. B. Fomini Woron.
+ Leaves equaling or exceeding the scape . . . . . 10. B. Lipskyi (Miscz.) Wulff.
12. Perianth yellowish-green . . . . . 11. B. lutea Bordz.
+ Perianth white, blue, violet or brown . . . . . 13.
13. Anthers yellow . . . . . 12. B. Wilhelmsii (Stev.) Woron.
+ Anthers violet or blue . . . . . 14.
14. Anthers violet; perianth segments white or yellow . . . . . 15.
+ Anthers blue; perianth segments azure . . . . . 13. B. montana (C. Koch) Boiss.
15. Perianth segments white . . . . . 14. B. Saviczii Woron.
+ Perianth segments yellow . . . . . 15. B. speciosa Woron.
16. Plants to 40 cm tall; raceme oblong-ovaloid . . . . . 16. B. pycnantha (C. Koch) A. Los.
+ Plants to 15 cm tall; raceme short-ovaloid . . . . . 17. B. acutifolia (Boiss.) Deloney.

Section **EUBELLEVALIA** Boiss. Fl. Or. V (1884) 301. — Perianth long, tubular-campanulate, brown, yellow, greenish, violet or blue.

1. B. turkestanica Franch. in Ann. Sc. Nat. Ser. 6, XVIII (1884) 256. — Hyacinthus turkestanicus Fedtsch. in sched.

Perennial; bulb ovoid; leaves 4, linear, ligulate, conduplicate, slightly exceeding the scape, prominently nerved, point-tipped, the margin cartilaginous and scabrous-ciliate; scape 10 cm long; flowering raceme
397 dense, oblong-obovaloid; bracts white, rounded; pedicels shorter than or as long as flower; flowers spreading to subnutant; perianth blue, 6 mm long, drying brown, campanulate; segments as long as tube, lance-triangular; filaments dilated toward base; anthers violet; capsule globose; fruiting pedicels curved at the ends. March. (Plate XXIII, Figure 9).

Slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Ibragim-ata. Type in Paris.

2. B. atroviolacea Rgl. in A.H.P. VIII, 2 (1833) 655, tab. VI. — Hyacinthus atroviolaceus B, Fedtsch., Rast. Turk. (1915) 250. — Exs.: Herb. Fl. As. Med. No. 345.

Perennial; bulb oblong-ovaloid to ovaloid-conical; to 3 cm long, the outer scales membranous, brown; leaves 4–6, broadly linear, slightly narrowed toward base, acutish, with hispid-ciliolate margin, 10–20 cm long, 4–10 mm broad; scape solitary, erect, glabrous, equaling or exceeding the leaves; raceme many-flowered, ovoid-oblong; perianth 8–9 mm long, campanulate-cylindric, dusky bluish-violet, enlarged toward apex; segments oval, broad, straight, spreading; stamens inserted at throat; anthers pale azure. March-April. (Plate XXIII, Figure 13).

Mountain slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Gissar. Type in Leningrad.

3. **B. albana** Woron. in Bull. Jard. Bot. Princ. XXVII, 6 (1927) 615. — B. glauca auct. fl. cauc., non Kunth. — Hyacinthus glaucus Miscz. in Acta. Inst. Agr. Kuban. V (1927) 155 p. p., non Baker.

Perennial; bulb 4 cm long, 3.5 cm in diameter, subglobose-ovaloid, the outer scales blackish; leaves 3 or 4, glaucescent above, green beneath, hispid-ciliate on the margin, thickened at apex, 13–14 cm long, 1.2–1.7 cm broad; raceme fairly loose; perianth 7–8 mm long, tubular-campanulate, dark brown; buds yellowish-violet; segment green-banded at apex, one-third the length of tube, extended or slightly open, flat or convex; pedicels 3 times the length of flower, becoming elongated, arcuately ascending in bud, arcuately spreading in fruit; filaments in free portion triangular, about as long as the violet anthers; style as long as filaments; capsule valves with entire margins. May-July. (Plate XXIII, Figure 5).

Dry slopes. — Caucasus: E. Transc. (Ganzha, Kura River valley). Endemic. Described from a specimen grown in the Tiflis Botanical Garden from bulbs collected near Adzhikabul. Type in Tiflis.

4. **B. sarmatica** (Pall.) Woron. in Bull. Jard. Bot. Princ. XXVI (1926) 615; Grossh., Fl. Kavk. I (1928) 235. — *Hyacinthus sarmaticus* Pall. Enum. Taur. in Nov. Acta Acad. Petrop. X (1795) 595; Miscz. in Acta.
398 Inst. Agr. Kuban. V (1927) 155; Schmal'g., Fl. II, 497; Ldb. Fl. Ross. IV, 153. — *H. ciliatus* auct. Fl. Ross. — Ic.: Ker.-Gawl. Bot. Reg. (1819) 394.

Perennial; bulb ovaloid, 2–4 cm in diameter; leaves 3–7, lorate, fleshy, narrowed toward base, mucronate, the cartilaginous margin ciliate; scape stout, 15–30 cm long; raceme many-flowered, elongated, oblong-ovaloid; flowering pedicels erect spreading, 4–8 times the length of flower; fruiting pedicels indurated, horizontally spreading, strongly elongating up to 12 cm, more or less straight; bracts small, deltoid, or greatly reduced; perianth campanulate, 8–9 mm long, grayish-brown; segments straight, oval-lanceolate, one-third the length of tube, yellowish-white; stamens uniseriate; anthers violet, short; capsule oblong, 1–2.3 cm long, slightly compressed, the cells 2–6-seeded. May-June. (Plate XXIII, Figure 3b–e).

Steppes and dry hills. — European part: Crim., Bl., L. Don, L. V., M. Dnp.; Caucasus: Cisc. Endemic. Described from the Crimea.

5. **B. zygomorpha** Woron. in Bull. Jard. Bot. Princ. XXVI, 6 (1927) 618; Grossg., Fl. Kavk. I, 233.

Perennial; bulb 5 cm in diameter, the outer scales black; leaves green, lance-lorate, narrowed toward base, erect, revolute, scaberulous-margined, 20 cm long, 3–3.5 cm broad; raceme oblong-cylindric, loose, 16 cm long; flowering pedicels nodding; fruiting pedicels arching; perianth tubular-campanulate, 10–11 mm long, about as long as pedicel; buds violet, the tube becoming light brown, green-banded, 7–8 mm long; segments one-third to one-half the length of perianth, unequal, the lower more elongate, exceeding the upper by 2–3 mm, flat outside, round-tipped, folded along the midrib; filaments linear; anthers violet, as long as filaments; capsule with emarginate valves. May-June. (Plate XXIII, Figure 12).

Steppes, dry slopes, and among field crops. — Caucasus: E. Transc., Tal. Endemic. Described from a specimen grown in the Tiflis Botanical Garden from bulbs collected in the former Lenkoran District. Type in Tiflis.

Plate XXIII

1. Hyacintella leucophaea Schur.: 1b) flower, 1c) flower in section, 1d) capsule, 1e) seed.– 2. H. Pallasiana (Stev.) A. Los., flower.– 3. Bellevalia sarmatica (Pall.) Woron.; 3b) flower, 3c) flower in section, 3d) leaf tip, 3e) capsule.–4. B. speciosa Woron., flower.– 5. B. albana Woron., flower.– 6. B. araxina Woron., flower.– 7. B. Fomini Woron., flower.– 8. B. Saviczi Woron,, flower.– 9. B. turkestanica Franch,, flower.– 10. B. Wilhelmsii Woron., flower.– 11. B. Lipskii Miscz., flower.– 12. B. zygomorpha Woron. flower.– 13. B. atroviolacea Rgl., flower.– 14. Hyacinthus Litwinowii W. Czern.; 14b) flower, 14c) flower in section, 14d) capsule.– 15. H. transcaspicus Litw., flower.– 16. H. kopetdaghi E. Czerniak., flower.

401 6. B. **longistyla** (Miscz.) Grossh., Fl. Kavk. I (1928) 235.— Hyacinthus longistylus Miscz. in Acta Inst. Agr. Kub. V (1927) 157.

Perennial; bulb globose, 4 cm long; leaves lanceolate, to 30 cm long, 2 cm in diameter, more or less narrowed toward base, acuminate, the margin naked or scarcely ciliate; raceme elongate, 15–25-flowered, with numerous sterile flowers at the top; pedicels the length of flower, erect or reclinate, at length spreading, horizontal in fruit, 5 cm long; perianth in herbarium ferruginous-purple, long tubular-campanulate, 12 mm long, the tube 8–9 mm long, narrower upward; segments acute, straight, white, one-third to one-half the length of tube; style exserted; capsule large, ovoid, strongly flattened, cuspidate; capsule cells 1- or 2-seeded. April.

Valleys, and among field crops.— Caucasus: S. Transc. **Gen. distr.**: Iran. Described from Osmangenskii Pass and from the Araks River. Type in Tiflis.

7. B. **araxina** Woron. in Bull. Jard. Bot. Princ. XXVI, 6 (1927) 614.— Hyacinthus ciliatus var. grandiflorus Bordz. in Scripta Soc. Nat. Kiew, XXV (1915) 76.

Perennial; bulb 6 by 5 cm, ovaloid-globose, with rusty gray outer scales; leaves 7, broad, oblong-lorate, glaucescent, ciliate-margined, 16 cm long, 2.5–4 cm broad; raceme dense, many-flowered; flowers campanulate, 11–12 mm long; buds pale violet; perianth brown; segments white, green-banded, half the length of tube, flat or abaxially convex, wide open; pedicels 2–3 times the length of flower, arcuately nodding, becoming elongated, erect or spreading, horizontal in fruit; filaments in free portion triangular; anthers pale azure, exserted, as long as the style. May-June. (Plate XXIII, Figure 6).

Slopes.— Caucasus: S. Transc. Endemic. Described from a specimen grown in the Tiflis Botanical Garden from bulbs collected in Nakhichevan. Type in Tiflis.

8. B. **Aucheri** (Baker) A. Los. comb. nov.— Hyacinthus Aucheri Baker in Journ. Linn. Soc. XI (1871) 433.— Bellevalia ciliata var. stenophylla Boiss. Fl. Or. V (1884) 302.— B. glauca f. stenophylla Fomin. in sched. Herb. Mus. Cauc.

Perennial; bulb hemispherical, 2–2.5 cm long, 1.5–2 cm in diameter; leaves oblong-lanceolate, to 30 cm long, 0.5–1 cm broad, gradually narrowed toward base, slightly folded, with cartilaginous slightly pectinate-ciliate margin, somewhat wavy, more or less revolute, as long as the scape; flowering raceme dense, oblong-conical, becoming elongate-cylindric; pedicels equal, about twice the length of flower; flowers 5–6 mm
402 long, campanulate, blue in bud, becoming reddish (in dry condition); segments broad, obtuse, greenish-yellow; stamens as long as the style. May.

Plains.— Caucasus: E. Transc. **Gen. distr.**: Iran. Described from Isfahan.

9. B. **Fomini** Woron. in Bull. Jard. Princ. XXVI, 6 (1927) 617; Grossg., Fl. Kavk. I, 233.— B. macrobotrys auct. Fl. cauc., non Boiss.— Hyacinthus macrobotrys ssp. caucasicus Miscz. in Acta Inst. Agr. Kuban. V (1927) 158.— Muscari Clusianum C. Koch in Linnaea XXII (1849) 253; Ldb. Fl. Ross. IV, 154, non Griseb.

Perennial; bulb 3 by 3.5 cm or 4 by 5 cm, with thick blackish scales; leaves 3–5, narrowed toward base, acuminate, 15–20 cm long, 1–2 cm broad, ciliolate-margined; raceme loose, cylindric; flowering pedicels nodding, as long as flower; fruiting pedicels arcuately ascending; buds dark violet; perianth tubular, to 7 mm long, grayish-violet; segments half the length of tube, blackish-tipped, convex-backed outside, flat within; filaments in free portion triangular, as long as the yellow anthers; capsule ovaloid-globose, the valves with entire margins. May-June. (Plate XXIII, Figure 7).

Steppes and hills. — Caucasus: E. Transc. Described from a specimen grown in the Tiflis Botanical Garden from bulbs collected in Peidzheli-bar. Type in Tiflis.

10. **B. Lipskyi** (Miscz.) Wulff, Fl. Kryma, I, 3 (1928) 56. — Hyacinthus Lypskyi Miscz. in Acta Inst. Agr. Kuban. V (1927) 158. — Bellevalia trifoliata Pacz. in Mem. Soc. Nat. N. Ross. XV, 1 (1890) 829, non Kunth. — B. dubia Shmal'g., Fl. II, 489.

Perennial; bulb ovaloid, small; leaves 3, 25–35 cm long, 6–12 mm broad, commonly exceeding the scape, narrowed at both ends, cartilaginous-denticulate on the margin and often on the veins; raceme before anthesis cylindric, compactly conical at the top, becoming elongated to 6–15 cm, commonly 30-flowered; pedicels shorter than flower, elongating in fruit, spreading at first, horizontal at anthesis; bracts broadly triangular, 2- or 3-parted; uppermost flowers sterile, dusky violet; perianth of fertile flowers campanulate-tubular, dusky violet, becoming dingy yellow, 5–7 mm long, 3 mm broad; segments broadly ligulate, obtuse, cucullate, one-third to two-fifths the length of tube; anthers violet; capsule flattened, obovoid. April-May. (Plate XXIII, Figure 11).

Fields. — European part: Crimea (Balaklava, Alupka). Endemic. Described from Balaklava. Type in Leningrad.

11. **B. lutea** Bordz. in Ucr. Bot. Mag. III (1926) 50; Grossg., Fl. Kavk. I, 232.

403 Perennial; leaves long, linear, acuminate, equaling the scape, the margin cartilaginous white ciliate; scape 15–18 cm long; raceme oblong-ovoid; pedicels half as long again to twice the length of flower, recurved; perianth tubular, greenish-yellow in live condition, drying dingy brownish-violet; segments straight, ovate, slightly shorter than the tube; filaments triangular-lanceolate. April.

Dry grassy slopes. — Caucasus: E. Transc. Endemic. Described from Akhalkalaki (Dzhavakhetiya), at 1800 m above sea level. Type in Kiev.

12. **B. Wilhelmsii** (Stev.) Woron. in Bull. Jard. Bot. Princ. XXVI (1927) 617. — Muscari Wilhelmsii Stev. in Bull. Soc. Nat. Mosc. XXX (1857) 446. — B. glauca auct. fl. cauc., pro parte. — M. ciliatum β latifolium C. Koch. in Linnaea XXII (1849) 255.

Perennial; bulb 3 cm in diameter, subglobose-ovaloid, the outer scales dark grayish-brown; leaves 3 or 4, oblong-lanceolate, narrowed at base into a petiole, 25 mm broad, glaucescent, the margin cartilaginous-scabrous or ciliolate; raceme many-flowered, the upper flowers sterile;

buds dark violet; perianth brown 8–10 mm long, green-handed; segments imbricately connivent one-third the length of tube, triangular, light-colored, mucronate; flowering pedicels nodding, 12–15 mm long, at length arcuately divergent, in fruit spreading, 3–5 cm long; anthers yellow; capsule with emarginate valves, longer than the style. May. (Plate XXIII, Figure 10).

Dry hills and arable fields. — Caucasus: E. Transc. Endemic. Described from Georgia.

13. **B. montana** (C. Koch) Boiss. Fl. Or. V (1884) 304. — Muscari montanus C. Koch in Linnaea XXII (1849) 252; Ldb. Fl. Ross. IV, 153. — Hiacinthus glaucus var. montanus Miscz. in Acta Inst. Agr. Kuban. V (1927) 156.

Perennial; bulb ovaloid; leaves 4 or 5, oblong-lanceolate, 15–20 mm broad, narrowed toward base, acuminate, hyaline-margined, ciliolate, slightly shorter than scape; scape erect, 5–15 cm long; raceme oblong; pedicels very slender, erect, half as long again as perianth; perianth of the small sterile terminal flowers globose, azure; perianth of the fertile flower campanulate-tubular, 4–5 mm long, dusky brown; segments half the length of the lustrous tube, oblong-oval, obtuse; filaments lanceolate; anthers large, blue. May.

Mountain meadows. — Caucasus: S. Transc. Described from Lori and Shuragel'. Type in Berlin.

14. **B. Saviczii*** Woron. in Bull. Jard. Bot. Princ. XXVI, 6 (1927) 614. — Hyacinthus ciliatus B. Fedtsch., Rast. Turk. (1915) 250, non Cyrill.

404 Perennial; bulb large, broadly ovoid, 5 cm in diameter, the outer scales blackish-gray; leaves 3 or 4, oblong-lanceolate, 15–17 cm long, 29 mm broad, glaucescent above, the margin cartilaginous-scaberulous; raceme oblong-cylindric, in fruit oblong-ovaloid, 10–15 cm long; scapes 40 cm long; flowering pedicels spreading, twice the length of flower; fruit stipes arcuately spreading, elongating to 5 cm; flowers 9–10 mm long; perianth campanulate, the tube ferruginous-gray; segments white, spreading, obtuse, somewhat shorter than the tube; filaments dilated at base; anthers violet, exceeding the perianth; capsule oblong-ovaloid, about equaling the scape. March-April.

In the juniper zone. — Centr. Asia: Mtn. Turkm. (Kopet Dagh). Endemic. Described from plants grown in the Tiflis Botanical Garden from bulbs brought from Kopet Dagh Mountains (2600–3300 m). Type in Tiflis.

15. **B. speciosa** Woron. in Bull. Jard. Bot. Princ. XXVI, 6 (1927) 613. — Hyacinthus ciliatus var. genuinus Bordz. in Scripta Soc. Nat. Kiew. XXV (1915) 76. — Bellevalia ciliata Radde, Mus. Cauc. (1899) 165, non Hyac. ciliatus Cyr.

Perennial; bulb 5 by 5 cm, subglobose-ovoid, the outer scales blackish; leaves 5 or 6, glaucescent, lorate, 14–20 cm long, 2.5–3 cm broad, the

* Named for V.M. Savich, forester-botanist who first collected bulbs of this species.

margin cartilaginous ciliate; scape 20–40 cm long; raceme commonly the length of flower, many-flowered, containing up to 100 flowers, 8–20 cm long, broadly pyramidal; buds white; perianth 8–9 mm long, 4 mm broad, the tube brownish with lighter stripes; segments yellow, half the length of tube, convex outside, pedicels erect in bud, arcuately nodding in flower, at length horizontal, 2–3 times the length of flower, strongly elongating in fruit; anthers violet; capsule with entire valves, 13–14 cm long. May-June. (Plate XXIII, Figure 4).

Dry slopes and among field crops. — Caucasus: S. and E. Transc. **Gen. distr.**: Arm.-Kurd. Described from the vicnity of Tiflis and from a specimen grown in the Tiflis Botanical Garden from bulbs brought from the former Kars Region. Type in Tiflis.

Section **OXYODON** A. Los. sect. nov. — Sect. Botryanthus (Kunth.) Boiss. Fl. Or. V (1894) 228 p.p. — Sect. Hyacintella Boiss. Fl. Or. V, 305 p.p. — Perianth short-tubular, dark blue.

16. **B. pycnantha** (C. Koch) A. Los. comb. n. — Muscari pycnanthum C. Koch in Linnaea XXII (1849) 363; Ldb. Fl. Ross. IV, 154. — Bellevalia comosa Grossh., Fl. Kavk. I (1928) 233.

Perennial; bulb ovaloid, to 2 cm in diameter; leaves lanceolate,
405 10–15 mm broad, exceeding the scape, canaliculate, amplexicaul at base, acuminate; scape 25–40 cm long; raceme oblong-ovaloid, dense; sterile flowers few or none, globose and short-pediceled; fertile flowers dark blue, oblong-campanulate, as long as pedicels, spreading; perianth segments oval, subacute, white within, one-third the length of tube; stamens inserted at throat; anthers yellow. May-June.

Wet meadows. — Caucasus: S. Transc. Endemic. Described from Mount Alagez [Aragats]. Type in Berlin.

17.* **B. acutifolia** (Boiss.) Deloney in Mon. Jard. Tifl. n.s. I (1922–23) 44. — Muscari acutifolium Boiss. Fl. Or. V (1884) 300. — Exs.: Pl. or. exs. No. 276 (sub B. paradoxa).

Perennial; bulb oblong-ovaloid, 1.5 cm in diameter; leaves 2, rarely 3, narrowly lanceolate, narrowed toward base, acuminate, 6–12 cm long, 0.5 cm broad, commonly shorter than or equaling the scape; scape to 15 cm long, red at the top; raceme short, obovoid, compact, few-flowered; pedicels blue, spreading, slightly shorter than flower; perianth dark bluish-violet, short cylindric-campanulate to subglobose-ovoid; segments obtusish, straight, one-fourth the length of tube; anthers yellow; capsule globose, slightly flattened. May.

* This plant may possibly be identical with Muscari paradoxum (Fisch. et Mey.) Baker, p.421. (Editors).

Mountain and meadow slopes. — Caucasus: W. and S. Transc. Endemic. Described from Persut mountain plateau. Type in Geneva.

Genus 279. **HYACINTHUS*** TOURN.**

Inst. (1709) 344, pro parte; L. Gen. Pl. ed. V (1754) 149.

Perianth funnelform, the tube constricted above the ovary; segments reflexed, about the length of tube; stamens distinct, inserted below the middle of the tube, uniseriate; style short; stigma obtusish; ovary 3-locular, the locules 6–8-ovuled; capsule globose, compressed; leaves numerous, amplexicaul; scapes bearing a loose racemose inflorescence.

1. Wild plants; perianth not fleshy; flowers inodorous . . . . . 2.
+ Plants cultivated in gardens and greenhouses; perianth fleshy; flowers fragrant . . . . . *H. orientalis L.
2. Flowers to 15 mm long, blue or azure, perianth segments erect or spreading . . . . . 3.
+ Flowers 20–25 mm long, lilac; perianth segments twisted at the edge . . . . . 1. H. Litwinowii E. Czern.

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3. Leaves erect; bracts 1 mm long . . . . . 2. H. transcaspicus Ltw.
+ Leaves arcuately spreading; bracts 4 mm long . . . . . 3. H. kopetdaghi E. Czerniak.

1. H. Litwinowii E. Czern. in Not. Syst. Herb. H.P. IV, 19–20 (1923) 148.

Perennial; bulb ovoid, 2–4 cm long, with lilac scales; leaves 3 or 4, broadly oval-lanceolate, 15–17 cm long, 3–5 cm broad, thin, glabrous, subobtuse to acutish, scaberulous-margined (in f. contractus E. Czerniak.), horizontally spreading, glaucous, undulate at the margins; scapes 1 or 2, 15–20 cm (sometimes up to 25 cm) long; raceme dense, 3–13-flowered (in f. contractus E. Czerniak, 3–5-flowered); fruiting pedicels arcuately spreading, elongating to 8–12 mm; bracts binate, filiform-linear, free down to base, white-hyaline, 7–9 mm long; flowers 2–2.5 cm long, pale lilac-azure; perianth funnelform-campanulate, the tube enlarged toward base; perianth segments 8–10 mm long, lanceolate, acuminate, reflexed, the midrib darker colored; stamens biseriate; filaments slightly dilated, inserted below the middle of tube; anthers as long as or slightly shorter than filaments, 3 mm long, bluish, slightly exserted from tube; ovary ovaloid, with 3–4-ovuled locules; style 6 mm long, shorter than stamens; stigma 3-lobed; capsule globose, slightly flattened; seeds globose, rugose, black. April. (Plate XXIII, Figure 14b–d).

Stony slopes and rock crevices. — Centr. Asia: Mtn. Turkm. (Kopet Dagh). **Gen. distr.**: N. Iran. Described from Kopet Dagh. Type in Leningrad.

2. **H. transcaspicus** Litw. in Trav. Mus. Bot. Ac. Sc. XV (1916) 120. — Ic.: ibid., tab. V.

* Named after the Homeric hero Hyacinthos. According to legend, a hyacinth flower arose from a drop of the hero's blood.

** Arranged by A.S. Lozina-Lozinskaya.

Perennial; bulb ovaloid, 3 cm long; leaves 2 or 3, fleshy, glabrous, linear, erect, slightly enlarged toward apex; obtuse, narrowed toward base, amplexicaul, 16 mm long, 1.5 cm broad, slightly arched at apex, erect; scape equaling the leaves, mostly solitary (rarely 2), bearing a loose 4–10-flowered raceme; bracts scalelike, 1 mm long, colored or white, hyaline; pedicels shorter than to nearly equaling the flowers, erect at anthesis; flowers 1.5 cm long, campanulate, pale blue, not enlarged at throat; segments erect or spreading, equal, lanceolate, obtuse, as long as or slightly shorter than the tube; filaments linear, flattened, entire, shorter than perianth, inserted slightly below the throat; anthers yellow, versatile, 2–2.5 mm long; ovary ovaloid, slightly compressed, with 2-ovuled locules; style filiform, as long as the stamens. May. (Plate XXIII, Figure 15).

Mountains juniper woods. — Centr. Asia: Mtn. Turkm. (Kopet Dagh). Endemic. Described from vicinity of Ashkhabad. Type in Leningrad.

407 3. **H. kopetdaghi** E. Czerniak. in Not. Syst. Herb. H.P. IV, 19–20 (1923) 150.

Perennial; bulb ovoid, 3 cm long, 1.5 cm in diameter, truncate at base; leaves 2, linear-lanceolate, conduplicate, arcuately spreading, subobtuse, glabrous, 7–9 cm long, 4–5 (6–8) mm broad, amplexicaul below ground surface; scape mostly solitary, sometimes scape and pedicels red-tinged; pedicels appressed to scape, 3–4 mm long, half the length of flower; bracts binate, hyaline, lilac-tinged, linear, erect, 4 mm long, obliquely truncate at apex, equaling or slightly exceeding the flower, one of them abbreviated and thickened; flowers 13–14 mm long, dark blue; perianth tubular-campanulate; segments lanceolate, erect, acuminate; with a darker midrib, about as long as the tube; filaments linear, flat, inserted below the middle and reaching to 2/3 the perianth; anthers bluish, 3 mm long, slightly exserted from the tube; style elongated, as long as the stamens. May. (Plate XXIII, Figure 1).

Alpine zone and juniper woods, on soil rich in humus. — Centr. Asia; Mtn. Turkm. (Kopet Dagh). Gen. distr.: N. Iran. Described from Kopet Dagh. Type in Leningrad.

* **H. orientalis** L. Sp. Pl. (1753) 454; Boiss. Fl. Or. V (1884) 309. — Ic.: Bot. Mag. tab. 937.

Bulb to 8 cm in diameter; leaves to 2 cm broad, lustrous, canaliculate, subobtuse, equaling or shorter than the scape; scape 0.5 cm in diameter, terete, 20–50 cm long, bearing a loose 4–15-flowered raceme; flowers short-pediceled, erect to horizontally spreading in lower part; bracts binate, whitish or colored, acuminate; perianth to 2 cm long, tubular-funnelform, inflated in lower part, cleft nearly to the middle into lanceolate reflexed segments, fleshy, blue, red or white; stamens inserted below the middle of the tube, uniseriate.

Growing wild in Persia, Asia Minor, Syria, and Mesopotamia. Widely cultivated all over Europe. Best known is hyacinth cultivation in Holland where numerous horticultural varieties have been produced. In the USSR hyacinths are cultivated in the central and northern regions, in hotbeds and greenhouses. In Crimea and in the Caucasus, where commercial production has been initiated on a large scale, the plant winters in the ground.

Genus 280. **HYACINTELLA** * SCHUR.**

Schur. in Oest. Bot. Zeit. VI (1865) 227.

Flowers white or azure; perianth campanulate-funnelform; perianth
408 tube straight, of equal diameter throughout; perianth segments reflexed, one-third the length of tube; stamens inserted on the lower part of the tube, biseriate; anthers short; ovary ovoid-globose; capsule with rounded angles; leaves numerous, narrowly linear; scape bearing short fairly loose racemes.

1. Perianth segments spreading; flowers 5–6 mm long. . . . . 1. **H. leucophaea** (C. Koch) Schur.

+ Perianth segments not spreading; flowers 7–8 mm long . . . . . 2. **H. Pallasiana** (Stev.) A. Los.

1. **H. leucophaea** (C. Koch) Schur in Ö. B. Z. VI (1856) 228.— Bellevalia leucophaea Boiss. Fl. Or. V (1884) 305; Grossg., Fl. Kavk. I, 232.— Muscari leucophaeum C. Koch. in Linnaea XXII (1849) 254 — Hyacinthus leucophaeus Stev. ex Kunth, Enum. IV (1843) 312, nomen; Ldb. Fl. Ross. IV (1853) 156, descr.; Shmal'g., Fl. II, 497.— Ic.: Rchb. Ic. crit. IV, 27, tab 511.— Exs.: Shiraevskii, 1897, No No. 33.

Perennial; bulb ovoid, 1.5 cm in diameter; leaves 2 or 3, equaling the scape, to 20 cm long, linear, acute, 2–8 mm broad, reddish toward base, glabrous, smooth, cucullate; raceme loosely 10–20-flowered; pedicels horizontal or slightly ascending, as long as or slightly shorter than flower, azure at anthesis, fading green; bracts very small; perianth oblong-campanulate to oblong-funnelform, azure or white, cleft to 1/3; segments spreading, oval, obtuse; 5–6 mm long, 2–3 mm in diameter, the throat 5–6 mm across; anthers black; ovary broadly obovoid; capsule with rounded ribs, slightly flattened. April-May. (Plate XXIII, Figure 1 b–e).

Steppes, meadows, and slopes.— European part: M. Dnp., Bl., V.-Don, L. Don; ? Caucasus: Cisc. Gen. distr.: Bal.-As. Min. Described from S. Russia.

2. **H. Pallasiana** (Stev.) A. Los. comb. nova.— Hyacinthus Pallasianus Stev. in Bull. Soc. Nat. Mosc. XXX (1857) II, 85, in textu.

Perianth; bulb small, 1 cm in diameter, with whitish scales; leaves 1 or 2, linear, narrowed toward base, acuminate, 6–7 mm broad, 10–15 cm long, equaling or slightly exceeding the scape; raceme few-flowered, compact, broadly ovaloid; flowers borne on very short erect pedicels; perianth azure, narrowly funnelform, 8–10 mm long; segments oval, obtuse, not reflexed, with prominent midrib, less than one-third the length of tube; bracts very small, blue. May. (Plate XXIII, Figure 2).

Steppes.— European part: Bl., L. Don, Crim. Endemic. Described from the Crimea.

* Diminutive version of Hyacinthus.

** Arranged by A.S. Lozina-Lozinskaya.

Parl. Fl. Palermi I (1845) 435.– Sect. Leopoldia Boiss. Fl. Or. V (1884) 289.

Sterile flowers usually markedly different in color from the fertile, blue or violet; fertile flower brown or yellowish; perianth tubular, zygomorphic, with unequal short teeth, strongly constricted at throat, in upper part especially on outer lobes with hornlike processes; stamens inserted on tube, biseriate; filaments short; lower anthers larger than the upper; ovary oblong-ovoid; style short; stigma capitate; capsule 3-locular; leaves broadly lanceolate, conduplicate, succulent, as long as or exceeding the scapes; racemes long, cylindric.

1. Pedicels of sterile flowers much longer than those of the fertile, flowers forming a tassel . . . . . 1. L. comosa (L.) Parl.
+ Pedicels of sterile flower about as long as or shorter than those of the fertile flowers; inflorescence not tassellate . . . . . 2.
2. Pedicels of lower flowers several times the length of perianth; raceme broadly pyramidal . . . . . 2. L. longipes (Boiss.) A. Los.
+ Pedicels of lower flowers about the length of perianth . . . . . 3.
3. Perianth of fertile flowers tubular-cylindric, 3–4 times as broad; raceme very long . . . . . 3. L. tenuiflora (Tausch) Heldr.
+ Perianth of fertile flowers ovaloid-campanulate or short-cylindric, 2–2½ times as long as broad; raceme shorter . . . . . 4. L. caucasica (Griseb.) A. Los.

1. **L. comosa** (L.) Parl. Fl. Palerm., I (1845) 438.— Muscari comosum Mill. Dict. (1768) No. 2; Ldb. Fl. Ross. IV, 153; Shmal'g., Fl. II, 496.— Bellevalia comosa Kunth, Enum. IV (1843) 306.— Hyacinthus comosus L. Sp. Pl. (1753) 455.— Ic.: Redouté Lil. t. 231; Parl. Nuov. Giorn. Bot. Ital. XV (1883) t. 19.— Exs.: Fl. Stir. No. 1123.

Perennial; bulb 4 cm in diameter, globose, with light brown scales; leaves 3 or 4, fleshy, pale green, linear-lorate, 30–45 cm long, 8–15 mm broad, equaling or exceeding the scape; scape brown-speckled; raceme loosely 40–100-flowered, elongate at anthesis, 15–30 cm long; pedicels as long as or slightly longer than perianth, recurved in bud, horizontal in
410 flower, ascending in fruit; perianth urceolate, twice as long as broad, 4–5 mm long, 2–2.5 mm broad, tawny; sterile flowers bluish-violet, cuneate, their pedicels arcuately ascending, 3–4 times the length of perianth. July. (Plate XXIV, Figure 16 a–c).

Dry slopes, wood margins, and meadows.— European part: Crim., Bl. Gen. distr.: Med. Described from Europe. Type in London.

2. **L. longipes** (Boiss.) A. Los. comb. nova.— Muscari longipes Boiss. Diagn. Ser. I, 13 (1843–44) 37.

Perennial; bulb oblong-ovaloid, 2 cm in diameter, with light-colored scales; leaves 10–20 mm broad, conduplicate-canaliculate, undulate-margined, scaberulous, shorter than scape; scape 30 cm and over; raceme loose, 15 cm long, broadly pyramidal; pedicels flexuous, horizontally spreading, 2–6 times the length of perianth (to 3.5 cm long); perianth of sterile flowers cylindric, 2½ times as long as broad, brownish-violet;

* Named for Leopold II, duke of Tuscany (1824–59), who supported the botanist Parlatore in the organization of the Botanical Museum in Florence.

** Arranged by A.S. Lozina-Lozinskaya.

sterile flowers small, blue, their pedicels as long as or shorter than perianth; capsule oblong, acute. April-May.

Dry stony slopes. — Caucasus: E. Transc. Gen. distr.: E. Med., Iran. Described from Asia Minor. Type in Geneva.

3. **L. tenuiflora** (Tausch) Heldr. in Bull. Soc. Nat. Mosc. (1878) 70. — Muscari tenuiflorum Tausch in Flora XXIV (1841) 234; Shmal'g., Fl. II, 496. — Muscari tubiflorum Stev. Bull. Soc. Nat. Mosc. XXX (1857) 384. — Bellevalia tenuiflora Nyman. Consp. (1882) 732, suppl. 306.

Perennial; bulb 2.5 cm in diameter, obovoid; leaves broadly linear, erect or spreading, equaling the scape; raceme oblong-cylindric, 35 cm long; perianth of fertile flowers tubular-cylindric, 3–4 times as long as broad, tawny-brown; fertile pedicels slightly reclinate to horizontally spreading, as long as or shorter than perianth; sterile flowers numerous, in a long dense raceme, slenderly tubular-clavate, spreading or pendulous, bluish-violet, the pedicels as long as or slightly longer than perianth; capsule globose, 8–9 mm in diameter. May-June. (Plate XXIV, Figure 13).

Fields, slopes, and steppes. — European part: Bl., M. Dnp., Crim., Caucasus: Cisc., Dag., S. and E. Transc. Gen. distr.: E. Med., Bal.-As. Min. Described from Austria.

4. **L. caucasica** (Griseb.) A. Los. comb. nova. — Muscari caucasicum Griseb. ex Baker. in Journ. Linn. Soc. XI (1871) 414. — M. comosum var. tubiflora Trautv. in A.H.P. II (1873) 592. — Bellevalia caucasica Griseb. Fl. Rumel. II (1841) 387. — Muscari mutilatum Miscz. ex Grossh., Fl. Kavk. I (1928) 236. — M. comosum var. mutilatum Trautv. in A.H.P. VII (1880) 514.

411 Perennial; bulb 2 cm in diameter, with rosy-brown outer scales; leaves 2–4, rather fleshy, linear-lorate, erect, 18–22 cm long, 0.5 cm broad; scape to 20 cm long; raceme 20–40-flowered, becoming elongated at anthesis, 10 cm long, 2.5 cm broad; pedicels horizontal, the lower nodding, as long as or shorter than flower, 2.5–4 mm long; perianth of fertile flowers obovoid-urceolate, 4 mm long, brownish-violet; sterile flowers small, numerous, dense, urceolate-ovaloid, bright bluish-violet; their pedicels as long as or longer than perianth. April. (Plate XXIV, Figure 19).

Stony slopes and wood margins. — Caucasus: S. and E. Transc.; Centr. Asia: Mtn. Turkm. (Kopet Dagh). Gen. distr.: Iran. Described from Georgia.

Genus 282. **MUSCARIMIA*** KOSTEL.**

Kostel. Ind. Fl. Hort. Prag. (1844). — Mosharia Salisb. Gen. of pl. (1866) 25. — Sect. Muscarimia, gen. Muscari L. Baker Journ. Linn. Soc. XI (1871) 412.

All flowers nearly always fertile; perianth urceolate-cylindric, actinomorphic, with 6 teeth, enlarged below, in upper part with processes forming a 6-rayed star, constricted under the teeth into a very narrow throat and below the processes into a rather narrow neck; stamens inserted deep down the tube, biseriate; ovary globose, ovaloid-globose; style short;

* From Muscarimi or Muschirumi (i.e., Greek musk), Arabic name of the plant.

** Arranged by A.S. Lozina-Lozinskaya.

stigma 3-lobed; capsule broadly obovoid, enlarged below, narrowed upward, flattened, deeply cordate-truncate at base; leaves linear-lanceolate, fleshy, canaliculate; scapes succulent; racemes rather small, dense; flowers subsessile.

1. M. muscari (L.) A. Los. comb. nova. — M. moschatum Willd. Enum. Hort. Berol. (1809) 378; Ldb. Fl. Ross. IV, 154; Grossg., Fl. Kavk. I, 236. — Hyacinthus Muscari L. Sp. Pl. (1753) 817. — Botryanthus Sauli Jaub. et Sp. III. or. (1842) t. 329. — Muscari muscarimi Medic. in Uster. Ann. II (1791) 15. — Muscari ambrosiacum Moench, Meth. (1794) 637. — Ic.: Bot. Mag. t. 734.

Perennial; leaves 5 or 6, 10 or more mm broad, canaliculate, mucronate, equaling or slightly exceeding the scape, grayish-green; scape 10–20 cm long; raceme 20–50-flowered, short-cylindric; flowers horizontally spreading, borne on very short pedicels; perianth fleshy, tubular-urceolate, 8 mm long, pale yellowish-green, greenish below; perianth teeth very small; throat narrow, the processes forming a regular 6-rayed star, marcescent, the constriction below them becoming less
412 distinct after flowering; sterile flowers smaller lilac-tinged, or none; filaments short; style short; stigma sessile, 3-lobed; capsule 2 cm long, acutely 3-angled; horticultural form (β flava) is characterized by a long-cylindric yellow perianth with purple or black teeth. Flowers strongly odorous. April-May. (Plate XXIV, Figure 1 b–e).

Mountains. — Caucasus: E. Transc., Azerbaijan. **Gen. distr.**: Asia Minor, Kurdistan. Described from Asia Minor. Type in London.

Note. The occurrence of this species in the Caucasus is not authenticated. It is to be found in cultivation in gardens.

Genus 283. **MUSCARI*** MILL.**

Mill. Gard. Dict. ed. VIII (1768). — Muscari sect. Botryanthus Boiss. Fl. Or. V (1884) 294.

Perianth dolioform, constricted at throat, with 6 spreading teeth; the constriction in species of the section Pseudomuscari A. Los. very indistinct; ovary globose; stigma capitate; stamens biseriate, equal, included; flowers blue, azure, or violet, with a pleasant rather pungent scent; leaves numerous, linear; scape bearing a raceme of short-pediceled flowers.

1. Constriction at throat very distinct (Section Eumuscari A. Los.). . . 2.
\+ Constriction at throat indistinct, sometimes merely the teeth spreading (Section Pseudomuscari A. Los.) . . . . . 12.
2. Perianth oblong-cylindric . . . . . 3.
\+ Perianth broadly ovaloid . . . . . 8.
3. Perianth dark bluish-violet . . . . . 4.
415 \+ Perianth blue or azure . . . . . 7.
4. Leaves broadly linear; perianth to 1 mm long . . 1. **M. neglectum** Guss.
\+ Leaves narrowly linear; perianth smaller . . . . . 5.

* Name referring to the scent reminiscent of nutmeg or musk.

** Identification within this genus is very difficult with dried material. Generic differences are very indistinct in the herbarium as a result of drying (Arranged by A. S. Lozina-Lozinskaya).

Plate XXIV

1. Muscarimia muscari (L.) A. Los.: 1b) flower, 1c) flower in section, 1d) capsule, 1e) flower from above.– 2. Muscari racemosum Mill.· 2a) leaf tip, 2b) flower, 2c) flower in section, 2d) capsule.– 3. M. neglectum Guss., flower.– 4. M. botryoides Mill., flower.– 5. M. polyanthum Boiss., flower.– 6. M. dolychanthum Woron. et Fom., flower.– 7. M. Szovitzianum Baker, flower.– 8. M. Woronovii Tron et A. Los., flower.– 9. M. Steupi Woron. et Tron, flower.– 10. M. pendulum Trautv., flower.– 11. M. paradoxum Fisch., flower.– 12. M. Turkeviczi Woron., flower.– 13. M. coeleste Fom., flower.– 14. M. forniculatum Fom., flower.– 15. M. pallens Fisch., flower.– 16. Leopoldia comosa (L.) Parl. 16a) flower, 16b) flower in section, 16c) flower from above.– 17. L. tenuifolia (Tausch) Heldr., flower.– 18. L. longipes Boiss., flower.– 19. L. caucasica Baker, flower.– 20. Bellevalia acutifolia (Boiss.) Deloney: 20a) flower, 20b) flower in section.

5. Perianth blackish-violet; bulb with numerous offsets . . . . . 2. M. commutatum Guss.
+ Perianth bluish-violet; bulb without offsets . . . . . 6.
6. Leaves shorter than scape; perianth narrowed toward base . . . . . 3. M. racemosum (L.) Mill.
+ Leaves longer than scape; perianth not narrowed toward base . . . . . 4. M. leucostomum Woron.
7. Plants about 35 cm tall; perianth 8–10 mm long . . . . . 5. M. dolychanthum Woron. et Tron.
+ Plants about 20 cm tall; perianth 6–7 mm long . . . . . 6. M. Woronowii Tron et A. Los.
8. Pedicels 2–3 times the length of perianth . . . . 7. M. pendulum Trautv.
+ Pedicels as long as or shorter than perianth . . . . . 9.
9. Plants 40–60 cm tall; perianth to 8 mm long . . . . . 8. M. Steupii Woron. et Tron.
+ Plants lower; perianth shorter . . . . . 10.
10. Perianth darker, blue, broadly ovaloid . . 9. M. botryoides (L.) Mill.
+ Perianth lighter, azure, subspherical . . . . . 11.
11. Perianth teeth connivent, the white border descending to the middle of tube . . . . . 10. M. polyanthum Boiss.
+ Perianth teeth reflexed, the white border narrow, not descending down the tube. . . . . 11. M. Szovitzianum Baker.
12. Perianth violet. . . . . 12. M. Turkewiczii (Woron.) A. Los.
+ Perianth blue, azure, or almost white . . . . . 13.
13. Perianth pale azure to almost white, with rather distinct constriction at throat . . . . . 13. M. pallens M. B.
+ Perianth blue or intensely azure, with very indistinct constriction at throat . . . . . 14.
14. Perianth dark blue . . . . . 14. M. paradoxum Baker.
+ Perianth light blue or sky-blue . . . . . 15.
15. Perianth teeth azure . . . . . 16.
+ Perianth teeth at first white, becoming bluish . . . . . 17.
16. Perianth with white stripes . . . . . 17. M. forniculatum Fom.
+ Perianth with darker stripes . . . . . 18. M. coeleste Fom.
416
17. Perianth teeth nearly half the length of tube, initially incurved . . . . . 15. M. apertum Freyn. et Conrath.
+ Perianth teeth one-fourth the length of tube, initially straight . . . . . 16. M. coeruleum A. Los.

Section **EUMUSCARI** A. Los. — Sect. Botryanthus Boiss. Fl. Or. V, 288, p. p. — Botryanthus Kunth. Enum. IV (1843) p. p. — Perianth distinctly constricted at throat, the teeth recurved.

1. **M. neglectum** Guss. in Ten. Syll. App. V (1842) 13. — Botryanthus neglectum Kunth, Enum. IV (1843) 679. — M. altaicum Boiss. et Reut. Pugill. (1852) 114 ex Boiss. Fl. Or. V, 296. — M. atlantica Nym. Consp. (1882) 734.

Perianth; bulb to $3\frac{1}{2}$ cm long, with thick scales; leaves broadly linear, 6 mm broad, deeply grooved, exceeding the scape; raceme oblong,

30–40-flowered, dense; pedicels of fertile flowers spreading, shorter than or as long as perianth; perianth dark violet, long-ovaloid, subtubular, 10 mm long, with oval reflexed teeth; sterile flowers few, small, erect or slightly reclinate, short-pediceled; capsule subglobose, round-topped. March-April. (Plate XXIV, Figure 3).

Wood margins and rocky places. — Caucasus: Cisc., W., E. and S. Transc. Gen. distr.: Centr. Europe, Med., Bal.-As. Min. Described from Europe.

2. **M. commutatum** Guss. Fl. Sic. Prodr. I (1827) 426. — Hyacinthus commutatus Ten. Syll. (1831) 177. — Muscari acutibolum Bert. N. Comm. Bon. V (1842) 431; Boiss. Fl. Or. V, 296. — Botryanthus commutatus Kunth, Enum. IV (1843) 411. — B. albo-virens Tod. Ann. Sc. Nat. IV, 20 (1863) 304. Muscari albo-virens Nym. Syll. Suppl. (1863) 65.

Perennial; bulb ovoid, to 3 cm long, with dark tawny scales and numerous offset bulbils at base; scape 30 cm long, red at base; leaves 5 or 6, exceeding the scape, linear, 4 mm broad, pendent, pale and canaliculate above, green striped and convex beneath, the margin ciliate; raceme short, ovaloid, dense, containing about 20 flowers; pedicels shorter than to as long as perianth; perianth very dark, blackish blue-violet, oblong-ovoid, narrowed toward base, furrowed, 5 mm long, the small light-colored teeth incurved connivent; sterile flowers funnelform, small, light-colored; capsule obcordiform, deeply emarginate. March, April.

Middle mountain zone, among field crops and on slopes. — Caucasus: E. Transc. Gen. distr.: Med. Described from Sicily.

Note. The author has not seen the material relating to this species. The occurrence of the species in the Caucasus is not authenticated.

417 3. **M. racemosum** (L.) Mill. Gard. Dict. ed. 8 (1768) No. 31; Ldb. Fl. Ross. IV, 154; Shmal'g., Fl. II, 496. — Hyacinthus racemosus L. Sp. pl. (1753) 456. — Muscari Strangwaisii Tenore Ind. Sem. Hort. Nepal. (1837) 5, (1839) 9. — Botryanthus odorus Kunth, Enum. IV, (1843) 311. — Ic.: Redouté Lil. t. 232, IV.

Perennial; bulb ovoid, 2 cm in diameter; leaves narrowly linear, 2–3 mm broad, slightly enlarged upward, arched, furrowed on the abaxial face, to 15 cm long, shorter than the scape; raceme 2–3 cm long, oblong-ovoid, rather densely many-flowered; sterile flowers subsessile, ovaloid-tubular, bright azure; fertile flowers short-pediceled, oblong-ellipsoid, somewhat narrowed toward base, slightly furrowed, dusky violet, greenish toward base, 7 mm long, 3.5 mm broad; perianth teeth rounded, strongly spreading, white only down to throat; capsule narrowed toward base, slightly cordate at top. Characteristic development pattern: scape with buds developing first, the leaves appearing next and not surpassing the scape. April-May. (Plate XXIV, Figure 2 a–d).

Steppe slopes, scrub, hills, and rarely arable fields. — European part: M. Dnp., L. Don, Crim.; Caucasus: Cisc. Gen. distr.: Centr. Eur., Med. Described from Europe. Type in London.

Note. M. racemosum (L.) Mill. is a species composed of numerous races which need detailed study.

4. M. leucostomum Woron. in Fedde, Repert. sp. nov. XXVII (1930) 262.

Perennial; bulb oblong-ovaloid; leaves narrowly linear to subfiliform, spreading to sprawling, somewhat spirally coiled, to 30 cm long, exceeding the scape; scape reddish-brown below, to 20–25 cm long; raceme short-ovaloid, 1–1.5 cm long, dense; sterile flower bright azure, ovaloid-tubular, subsessile; fertile flower dark violet, oblong-dolioform, smooth, 6 mm long, 3.5 mm broad, the white rim usually extending down to tube, the white teeth strongly reflexed. Characteristic development pattern: leaves appearing first (December to January), the scape with buds appearing after the completion of leaf growth. March-April.

Slopes. — European part: Crim., Caucasus; E. Transc.; Centr. Asia: Mtn. Turkm. (Kopet Dagh), Amu D. (Tashkent), Pam.-Al. (Zeravshan). **Gen. distr.**: Iran. Described from Kopet Dagh from plants grown in the Botanical Garden of the Academy of Sciences in Leningrad. Type in Leningrad.

5. M. dolychanthum Woron. et Tron sp. nova in Addenda III, p. 744.

Perennial; bulb large, 3 cm in diameter; leaves 3–4, to 55 cm long,
418 broadly linear, 5–10 mm broad, slightly canaliculate, pointed, pendent, often twisted, considerably exceeding the scape, glaucescent above, bright green beneath, suffused with anthocyanin at base; scape 25–35 cm long, reddish-brown at base, erect; raceme 8–10 cm long, elongate-cylindric, densely many-flowered; pedicels of fertile flowers nodding, shorter than perianth; pedicels of sterile flowers erect; fertile perianth elongate-cylindric, same diameter throughout, 8–10 mm long, 5–6 mm broad; sterile flowers smaller; perianth bluish-violet, with darker longitudinal stripes enlarged at throat into a dark spot; perianth teeth oval-triangular, reflexed, obtuse, white. April. (Plate XXIV, Figure 6).

Alpine meadows. — Caucasus: W. Transc. Endemic. Described from Krasnaya Polyana, from town of Aibga, using plants grown in the Leningrad Botanical Garden. Type in Leningrad.

6. M. Woronowii Tron et A. Los. sp. nova in Addenda III, p. 744.

Perennial; leaves broadly linear, slightly concave and slightly canaliculate bright green above, glaucescent beneath, 6 mm broad, 35–40 cm long, exceeding the scape; raceme to 8 cm long, narrowly cylindric, loosely many-flowered; sterile flowers numerous, bluish-violet, longitudinally furrowed, short-pediceled; fertile flowers tubular-cylindric, 6–7 mm long, slightly constricted at throat, bluish-violet, the rather large teeth broadly reflexed, the white rim scarcely extending to tube; pedicels slightly shorter than perianth, slightly recurved. April. (Plate XXIV, Figure 8).

Slopes. — Centr. Asia: Mtn. Turkm. (Kopet Dagh). **Gen. distr.**: Iran. Described from Kopet Dagh, using plants grown in the Botanical Garden of the Academy of Sciences in Leningrad. Type in Leningrad.

7. M. pendulum Trautv. in A. H. P. II (1873) 484.

Perennial; leaves broadly linear, glabrous, entire, canaliculately conduplicate, arcuately spreading, as long as scape; raceme dense, 5 cm long, ovoid-ellipsoid; pedicels of sterile flowers as long as perianth;

pedicels of fertile flowers nodding, twice the length of perianth; perianth campanulate-ovaloid to dolioform, strongly constricted, violet-blue, 6 mm long, 4 mm broad, the rounded teeth one-fourth the length of tube. May. (Plate XXIV, Figure 10).

Foothills and wood margins. — Caucasus: W. and E. Transc. Endemic. Described from Kutaisi. Type in Leningrad.

8. **M. Steupii** Woron. et Tron. sp. nova in Addenda III, p. 745.

Perennial; bulb to 3 cm in diameter; leaves 3 or 4, broadly linear, 5–10 mm broad, 40–60 cm long, canaliculate, uniformly broad then slightly
419 tapering to an acute apex, pendent, considerably exceeding the scape, glaucous-green above, dark green beneath, suffused with anthocyanin at base; scape 30–35 cm long, reddish-brown at base; raceme elongate-cylindric, 8–10 cm long; pedicels of fertile flowers as long as or slightly shorter than perianth, arcuately spreading; lower sterile pedicels horizontal, the upper erect; fertile flowers violet-azure, oblong-dolioform, slightly narrowed toward base, enlarged in middle part; perianth 7–8 mm long, 5.5 mm broad, the throat at base of teeth white-rimmed; perianth teeth white, broad, triangular, reflexed; sterile flowers smaller; stamens obscurely biseriate. April. (Plate XXIV, Figure 9).

Alpine meadows. — Caucasus: W. Transc. Endemic. Described from cultivated specimens grown in the Leningrad Botanical Garden from bulbs brought from Krasnaya Polyana, from town of Aibga. Type in Leningrad.

9. **M. botryoides** (L.) Mill. Gard. Dict. ed. 8 (1868) No. 1; Ldb. Fl. Ros. IV, 154; Shmal'g., Fl. II, 496. — Hyacinthus botryoides L. Sp. pl. (1753) 318. — M. Strangwaisii Ten. Ind. Hort. Nepal. (1839) 12. — Botryanthus vulgaris Kunth, Enum. IV (1843) 311. — Ic.: Rchb. Icon. Bot. X, tab. 400, f. 998; Bot. Mag. t. 157.

Perennial; bulb of medium size; scape 10–20 cm long; leaves 20–30 cm long, 8 mm broad, somewhat succulent, broadly linear, narrowed toward base, equaling or exceeding the scape; raceme oblong-cylindric, many-flowered; pedicels shorter than or as long as the perianth; fertile flowers 4 mm long, subspherical, the perianth bluish-violet with short white slightly reflexed teeth; sterile flowers smaller; capsule obovoid. April-May. (Plate XXIV, Figure 4).

Slopes. — Caucasus: E. Transc. Gen. distr.: Centr. Eur. Described from Europe.

Note. Regel (A. H. P. VIII (1883) 655, tab. XIX) reports for Bukhara var. bucharicum Rgl. This plant is undoubtedly a distinct species but it is difficult to provide a description in the absence of sufficient material and merely on the basis of Regel's drawing which does not agree with herbarium material.

10. **M. polyanthum** Boiss. Fl. Or. V (1884) 297. — Exs.: Kotshy, 1859.

Perennial; bulb ovaloid; leaves broadly linear, canaliculate, pointed, convex, prominently nerved on the abaxial surface, glaucescent above, exceeding the scape; raceme rather loose, 5 cm long, oblong-ovaloid, to 25 cm long; sterile flowers pale violet, tubular; fertile flowers pale sky-blue, dolioform, slightly enlarged in upper part, 6 mm long, 4 mm broad, strongly constricted at throat; perianth teeth small, acutish,

connivent, reflexed at tips, the white rim spreading far down the tube; pedicels the length of perianth, horizontal, the upper ones slightly reclinate. Fl. April. (Plate XXIV, Figure 5).

420 Scrub and meadows in the middle mountain zone. — Caucasus: S. and W. Transc. **Gen. distr.**: Asia Minor. Described from Cappadocia and Cilicia. Type in Geneva.

11. **M. Szowitzianum** Baker in Gard. Chron. (1878) 799. — M. racemosum β brachyanthum Boiss. Fl. Or. V (1884) 295. — Ic.: Sosnovskii, Grossg., Shishk., Fl. Tifl. I (1925) 114.

Perennial; bulb 10–12 cm long, ovoid, with dark gray coats; leaves 2–4, narrowly linear, pendent, longer than the scape; scape to 15 cm long; raceme dense, oblong-ovaloid, 2.5–3.5 cm long; fertile flowers short-pediceled; perianth short-ovoid or ovaloid-urceolate, to 5 mm long and 4 mm broad, pale blue to azure or rarely white; perianth teeth deltoid, spreading, white; sterile flower few, dense, sessile, lighter in color; capsule 3–4 mm long, March-April. (Plate XXIV, Figure 7).

Rocky places and scrub. — Caucasus: Cisc., S. and E. Transc., Dag. Endemic. Described from a cultivated specimen in Kew Gardens. Type in London.

Section **PSEUDOMUSCARI** A. Los. sect. nova. — Sect. Botryanthus Kunth, Enum. IV (1843) p.p. — Perianth not constricted at throat, the teeth straight or slightly recurved.

12. **M. Turkewiczii** (Woron.) A. Los. comb. nova. — Hyacinthella Turkewiczi Woron. in Not. Syst. Herb. H.P. V, 6 (1924) 88.

Perennial; bulb broadly ovaloid to subglobose, 1.4–2 cm long, with hyaline scales; leaves 2 or 3, linear, arched-recurved, 10–11 cm long, 5–6 mm broad, exceeding the scape, slightly cucullate; raceme ovaloid, 20–30-flowered; perianth cylindric-campanulate, intensely violet, 7 mm long, 4 mm broad; pedicels elongate, one-third to one-fourth the length of tube, weak, reflexed; pedicels slightly shorter than perianth, horizontal, at length pendulous; stamens included in perianth, distinctly biseriate; anthers azure. June. (Plate XXIV, Figure 12).

Rocky slopes. — Caucasus: possibly occurring in W. Transc. **Gen. distr.**: Arm.-Kurd. Described from Mount Kvakhid (former Artvin District). Type in Leningrad.

13. **M. pallens** M.B. Fl. taur.-cauc. I (1808) 283; Ldb. Fl. Ross. IV, 154; Shmal'g., Fl. II, 496; Grossg., Fl. Kavkaza I, 236. — Hyacinthus pallens Sweet, Flow. Gard. (1827) tab. 259.

Perennial; bulb ovaloid, small; leaves linear, slightly enlarged upward, pointed, convex beneath, equaling or slightly exceeding the scape; scape 15–20 cm long; raceme dense, oblong-ovaloid, short; sterile flowers
421 small; fertile flowers nodding, the short pedicels recurved, the oval perianth white or azure suffused with violet, the oval teeth reflexed; capsule compressed, with obcordate valves. May. (Plate XXIV, Figure 15).

Alpine and subalpine meadows. — Caucasus: E. Transc., Dag. Endemic. Described from Georgia. Type in Leningrad.

14. **M. paradoxum** (Fisch. et Mey.) Baker Journ. Bot. (1874) 6; Ldb. Fl. Ross. IV, 153. — Bellevalia paradoxa Boiss. Fl. Or. V (1884) 308. — Hyacinthus paradoxus Fisch. et Mey. Ind. Sem. Horti B. Petrop. I (1835) 20. — Bellevalia pseudomuscari Boiss. et Buhse in Boiss. Diagn. ser. II, 4 (1842–44) 110.

Perennial; bulb narrowly ovaloid, 1.5 cm in diameter; leaves 2, rarely 3, narrowly lanceolate, linear, canaliculate, gradually narrowed upward, 10–20 cm long, exceeding the scape; scape 10–15 cm long; raceme ovaloid, loose, often many-flowered; pedicels shorter than perianth, horizontal; perianth blue, campanulate-oblong, the broadly oval segments one-third the length of tube, slightly reflexed; anthers yellow. May. (Plate XXIV, Figure 11).

Alpine meadows. — Caucasus: W. Transc. Gen. distr.: Iran. Described from Adzharistan. Type in Geneva.

15. **M. apertum** Freyn et Conrath in Bull. Herb. Boiss. V (1896) 194. — Bellevalia aperta Grossh., Fl. Kavk. I (1928) 233.

Perennial; bulb small, ovaloid, 1.5 mm in diameter, with brown scales; leaves linear, 20 cm long, 6 mm broad, slightly spatulate, erect or falcately recurved, flat or more or less revolute, striated, glabrous, obtusish, exceeding the erect scape; raceme short, ovaloid-conical, very dense; flowers small, 4 mm long, shorter than or as long as the nodding pedicels; perianth pale blue, shortly campanulate-cylindric, scarred below, open; perianth teeth oblong-oval, more or less elongate, reflexed; stamens biseriate, included in perianth; anthers globose; sterile flowers ellipsoid, slightly clavate, pale cornflower-blue, short-pediceled to subsessile. April-May.

Slopes in lower mountain zone. — Caucasus: S. Transc. Endemic. Described from Akhtala, at 800 m.

16. **M. coeruleum** A. Los. sp. nova in Addenda III, p. 745.

Perennial; bulb oblong, 1–2 cm in diameter, with light-colored outer scales; leaves 2, linear, narrowed toward base, pointed, flat, distinctly nerved, 10–18 cm long, 3 mm broad, shorter than the scape at anthesis, exceeding it in fruit; raceme short, ovoid, contracted, few-flowered; pedicels reclinate, 1.5 mm long; pedicels and often the rachis of raceme azure; bracts white, obtuse, less than 1 mm long; perianth ovaloid-
422 cylindric, drying blue, 5 mm long, 3 mm broad; perianth teeth white, oval, obtuse, 1.75 mm long, nearly straight; constriction at throat obsolescent; sterile flowers small, claviform; anthers globose, blue; capsule small, 4 mm long, 6 mm broad, narrowed below, slightly flattened. June.

Alpine meadows. — Caucasus: Cisc. (Balkariya). Endemic, Described from Balkariya. Type in Leningrad.

17. **M. forniculatum** Fom. in Monit. Jard. Tifl. No. 9 (1908) 11. — Bellevalia forniculata Deloney in Monit. Jard. Tifl. 1 (1922–23) 44.

Perennial; bulb globose, the outer scales thick brown; leaves erect, linear-lanceolate, canaliculate, cucullate, tapering toward base, equaling the scape; raceme conical before anthesis, ovaloid at anthesis, rather loose; pedicels pendulous, shorter than to about as long as perianth; perianth campanulate, 6 mm long, 5 mm broad, azure, with white

longitudinal stripes, slightly rugose; perianth teeth broadly white-margined, oval, obtuse, recurved; filaments uniseriate, strongly dilated; anthers pale yellow; ovary subtriquetrous, grooved. May. (Plate XXIV, Figure 14).

Rocky slopes. — Caucasus: possibly occurring in S. Transc. Gen. distr.: Arm.-Kurd. Described from vicinity of town of Olty [Turkey]. Type in Tiflis.

18. **M. coeleste** Fom. in Monit. Jard. Bot. Tifl. 9 (1908) 11. — Bellevalia coelestis Grossh., Fl. Kavk. I (1928) 233.

Perennial; bulb subglobose-ovaloid, with white outer scales; leaves lanceolate, involute, acute, tapering toward base, erect, equaling or exceeding the inflorescence; raceme broadly conical pointed before anthesis, oblong loose at flowering; flowers nodding; pedicels shorter than perianth; perianth narrowed at summit, campanulate, bluish-azure, with darker longitudinal stripes reaching the margin; perianth teeth broadly ovaloid-triangular, recurved. April-May. (Plate XXIV, Figure 13).

Dry slopes. — Caucasus: possibly occurring in S. Transc. Gen. distr.: Arm.-Kurd. Described from vicinity of Kars. Type in Tiflis.

Subfamily 5. **Asparagoideae** VENT.

Underground rhizome simple or branched, terminating in a more or less leafy floriferous stem, the lateral branches producing supplementary flowering shoots; flowers small, axillary or terminal, solitary or racemed; perianth segments mostly united, rarely distinct; fruit a 2–5-locular berry; seeds few.

423 Key to Genera

1. Outer perianth segments green, sepaloid, the inner more or less petaloid . . . . . 2.
+ Outer and inner perianth segments alike . . . . . 3.
2. Cauline leaves 4 or more, in a terminal whorl; inner perianth segments very narrow and long . . . . . 294. **Paris** L.
+ Cauline leaves 3, verticillate; inner perianth segments clear white, broad . . . . . 295. **Trillium** L.
3. Cauline leaves 2, broadly lanceolate to elliptic; flowers white, in a slightly nodding 1-sided raceme; berries red . . . . 293. **Convallaria** L.
+ Cauline leaves numerous, and if 2 then cordate at base . . . . . 4.
4. Cauline leaves very small, reduced to white scales, with narrow or broad leaflike branches in their axils. . . . . 5.
+ Cauline leaves green, rather large . . . . . 7.
5. Stamens distinct; flowers solitary or clustered; pedicels slender, in the axils of slender leaflike acicular branches . . . . 284. **Asparagus** L.
+ Stamens cupuliformly united; flowers borne on the midrib of rather broad rigid phyllocladia or pediceled in a terminal raceme . . . . . 6.
6. Flowers polygamous; stamens 6, flowers in terminal racemes . . . . . 285. **Danae** Medic.

+ Flowers dioecious; stamens 3, flowers solitary or in small clusters on the face of phylloclads. . . . . 286. Ruscus L.

7. Perianth gamophyllous, cylindric or campanulate; flowers in the axils of stem leaves . . . . . 292. Polygonatum Tourn.

+ Perianth segments distinct or united merely at base. . . . . 8.

8. All leaves radical; flowers white in a short raceme; berries blackish-blue, rather dry . . . . . 287. Clintonia Raf.

+ Leaves gathered about the middle of stem or rather evenly spaced . . 9.

9. Stem always simple . . . . . 10.

+ Stem commonly forked or rarely simple . . . . . .11.

10. Stem leaves 2, cordate-oval; flowers small, white, often fragrant, in an erect raceme . . . . . 289. Majanthemum Wiggers.

+ Leaves evenly spaced along the stem . . . . . 288. Smilacina Desf.

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11. Flowers white; raceme small, subtended by the uppermost leaf . . . . . 290. Disporum Salisb.

+ Flowers solitary, axillary, greenish or reddish . . . . . 291. Streptopus Mich.

Genus 284. **ASPARAGUS*** L.**

L. Gen. pl. (1754) 147.

Flowers mostly in the axils of scalelike leaves, 2 to several, in the USSR flora exclusively dioecious; perianth 6-merous; stamens 6; ovary 3-locular; fruit a berry. In the USSR only herbaceous; rhizome developed; stems much branched; cladodes numerous, mostly acicular, clustered in the axils of hyaline scalelike leaves, these often produced at base into an indurated spur.

1. Plants glabrous, not forming cladodes . . . . . 2.

+ Plants always forming cladodes . . . . . 3.

2. Pedicels 2–6 mm long, erect . . . . . 4. A. turkestanicus M. Pop.

+ Pedicels 10–15 mm long, mostly nodding . . . . . 5. A. Popovii Iljin.

3. Cladodes and branchlets prominently 3-angled or flattened-triquetrous; all flowers 2–4 mm long, sessile or nearly so . . . . . 4.

+ Cladodes terete or flattened or irregularly angled, never triquetrous; staminate flowers mostly 5 (4)–8 mm long . . . . . 5.

4. Plants yellowish-green, rather dull; flowers borne on the main stem and branches. Far East . . . . . 2. A. schoberioides Kunth.

+ Plants green, conspicuously lustrous; flowers borne solely on branches. . . . . 1. A. verticillatus L.

5. Flowers borne at the terminal ramifications of branches of first order, none on main stem. Transbaikalia . . . . . 8. A. Misczenkoi Iljin.

+ Flowers borne on the main stem and on branches (the lower part of pedicels always visible). . . . . 6.

6. Anthers spherical, one-fourth the length of filament; cladodes very slender, capillary, 0.1–0.2 mm long; berry large, often up to 10 mm long . . . . . 3. A. tenuifolius Lam.

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+ Anthers oblong or ovaloid-oblong, equal, scarcely longer or shorter than filaments; berry mostly not more than 7–8 mm long (except A. oligoclonos Maxim.) . . . . . 7.

* A plant name mentioned by Theophrastus.

** Arranged by M.M. Il'in.

7. Flowers sessile or the pedicels shorter than the perianth of staminate flowers . . . . . 8.
+ Flowers long-pediceled, the pedicels markedly longer than the perianth of staminate flowers . . . . . 12.
8. Cladodes rather thick, prickly, at a right or obtuse angle to the stem; stem and branches often geniculately bent; plants of deserts and semideserts . . . . . 9.
+ Cladodes always forming an acute angle with their branch . . . . . 10.
9. Plants yellowish-green, quite smooth; stem and branches geniculately bent; cladodes 10–45 mm long, pubescent below, forming an obtuse angle with the branch; berries retaining their bright red color for a long time. Sands of the Lake Balkhash area . . . . . 10. A. **angulofractus** Iljin.
+ Plants grayish-green or green; branches and cladodes cartilaginous-denticulate (under magnifying glass); cladodes shorter, sometimes not exceeding 20 mm, forming a right angle with the branch; berries soon turning black. Deserts and semideserts of the Aral-Caspian area. . . . . 9. A. **Breslerianus** Schult.
10. Cladodes rather thick, 1 (0.75)–1.5 across, smooth. Plants of sandy places in the NE part of Central Asia . . . . . 11. A. **soongoricus** Iljin.
+ Cladodes thinner, ca. 0.5 mm across. Plants of E. Siberia . . . . . 11.
11. Branches mostly arising at an acute angle; cladodes commonly equal, in fascicles of 1–3 (very rarely up to 6), at the ends of branches of last order always solitary; all cladodes and branches smooth; anthers shorter than filaments . . . . . 13. A. **dahuricus** Fisch.
+ Branches mostly arising at a right angle; branches and cladodes covered with scattered cartilaginous tubercles; cladodes mostly in fascicles of 4–8, unequal, even the terminal ones very rarely solitary; anthers slightly longer than filaments . . . . . 12. A. **tuberculatus** Bge.
12. Cladodes, branches and tips of stems profusely covered with short soft and often somewhat crisp hairs . . . . . 6. A. **bucharicus** Iljin.
+ Cladodes and branches smooth or cartilaginous-tuberculate, but not hairy . . . . . 13.
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13. Cladodes many in fascicle, slender, often subcapillary, throughout the length of stem and at the base of lowest branch always persistent in a dense cluster. Mountain plant associations of S. Altai, Tien Shan, and Pamir-Alai . . . . . 7. A. **neglectus** Kar. et Kir.
+ Cladodes on lower part of stem always deciduous, never peristent at the base of lower branches . . . . . 14.
14. Stem and branches striated, the elevated striations usually somewhat wavy and here and there apparently zigzag; cladodes always straight, strongly striated; pedicels very long; staminate flowers 7–10 mm long; berries large, 8–10 mm long. Far East . . . . . 22. A. **oligoclonos** Maxim.
+ Plants with differing characteristics; flowers and berries smaller. Other regions . . . . . 15.
15. Cladodes, branches, and often the stem cartilaginous-denticulate (under strong magnification) throughout or merely here and there; pedicels jointed above the middle . . . . . 16.
+ Cladodes, branches and stem quite smooth . . . . . 21.

16. Stem flexuous, often trailing or scandent; cladodes always falcate and spreading. Plants characteristic of solonchaks . . . . . 15. A. brachyphyllus Turcz.

\+ Stem erect, never trailing or scandent. . . . . 17.

17. Plants yellowish-green; cladodes rather thick, 0.75–1 mm in diameter; leaves [?] flattened, mostly in fascicles of 3 (1.6), commonly unequal, rarely straight, mostly somewhat curved, appressed to branches or set at a decidedly acute angle. Plants of the Aral-Caspian semidesert. . . . . 14. A. kasakstanicus Iljin.

\+ Cladodes thinner, mostly not more than 0.5 mm in diameter, usually more in fascicle. Plants of other regions. . . . . .18.

18. Cladodes unequal; pedicels shorter than to barely longer than the perianth of staminate flowers. Transbaikalia . . . . . 12. A. tuberculatus Bge.

\+ Cladodes commonly equal; pedicels decidedly longer than the perianth of staminate flowers. Other regions . . . . . 19.

19. Berries ovaloid-globose, pointed at the top. Caucasus . . . . . 21. A. caspius var. oxycarpus (Stev.) Miscz.

\+ Berries globose. European part . . . . . 20.

20. Cladodes small, 3–5 mm long (only on vegetative shoots to 10 mm long), 6–20 in fascicle, divaricate, smooth. Dniester area. . . . . 17. A. pseudoscaber Grecescu.

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\+ Cladodes 10 (5)–50 mm long, in fascicles of 4–6, obliquely ascending in weakly spreading, slightly tuberculate-scabrous at least in some parts. Crimea. . . . . .18. A. Levinae Klok.

21. Plants yellowish-green, very lustrous; cladodes to 8 cm long, to 2 mm in diameter, flattened, obliquely ascending. Gypseous clays of the Aral-Caspian area . . 14. A. kasakstanicus subsp. gypsaceus Iljin.

\+ Cladodes not flattened, thinner. Other habitats . . . . . .22.

22. Stem flexuous, often trailing or scandent; branches at a right angle; cladodes also at a right angle, rarely somewhat ascending or descending; pedicels jointed well above the middle. . . . . .16. A. persicus Baker.

\+ Stem always erect; branches with rare exceptions and cladodes at an acute angle; pedicels mostly jointed at the middle, rarely decidedly higher up . . . . . 23.

23. Pedicels shorter to barely longer than the staminate perianths. Transbaikalia . . . . . 13. A. dahuricus Fisch.

\+ Pedicels markedly longer than the staminate perianths. Other regions. . . . . .24.

24. Cladodes very thin, capillary, 0.125–0.2 mm in diameter . . . . . 20. A. setiformis Kryl.

\+ Cladodes thicker, to 0.3–0.5 in diameter . . . . . 25.

25. Cladodes flabellately divaricate; branches often strongly spreading. . . . . 26.

\+ Cladodes nearly appressed to branches or obliquely ascending, not glabellately spreading; branches set at an acute angle . . . . . 27.

26. Plants 30–50 cm tall; cladodes 5–10 mm long. Rocky places in the Crimea. . . . . .24. A. litoralis Stev.

+ Plants very tall; cladodes 10–30 mm long. Groves, woods, gardens, and meadows in the Caucasus . . . . . 21. A. caspius Hohen.

27. Cladodes thin, 1–3 cm long . . . . . 19. A. officinalis L.

+ Cladodes rather thick, mostly about 0.5 (0.25–1) cm long . . . . . 23. A. polyphyllus Stev.

Subgenus **EUASPARAGUS** Baker, Journ. Linn. Soc. XIV (1875) 594.— Dioecious plants; cladodes linear or subulate.— Only this subgenus is represented in the flora of the USSR.

Section 1. ARCHIASPARAGUS Iljin (stirps A. verticillati, pro parte et stirps A. lucidi Baker, l.c.).— Cladodes always strongly triquetrous, with acute angles.— An ancient sylvestrine type of the Tertiary period,

428 1. A. **verticillatum** L. Sp. pl. ed. 2 (1762) 450; Ldb. Fl. Ross. IV, 129; Shmal'g., Fl. II, 477. — A. verticillaris Lam. Encycl. I (1783) 297.— A. tricarinatus Redouté, Lil. (1813) t. 451.— A. volubulis Georgi, Beschr. Russ. Reich. Nachtr. (1802) p. 268.— Ic.: Rev. Hort. (1916) 142.— Exs.: Lang. et Szovits Hrb. Ruth. cent. I, No. 15.

Perennial or fruticose; stem 75–150 cm long, subscandent, angled, branched; terminal branchlets lustrous, sharply 3-angled, the margin minutely and often cartilaginously denticulate; cladodes on main stem up to 20 in fascicle, on the branches 1–3, divaricate, to 3–6 cm long, rarely to 0.5–1.5 mm long (var. tricarinatus Miscz. = var. brevifolius Stev. = var. floribunda Baker), lustrous; scalelike leaves calcarate; flowers only at the ends of branches of the last order; perianth hemispherical, small, ca. 4 mm long, the short pedicels jointed at or scarcely above the middle; berries the size of peas. June.

Wood margins, scrub, stony places, and shores.— European part: M. Dnp., Bl., L. Don, L. V. (Ergeni), Crim.; Caucasus: Cisc., Dag., W., E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm. **Gen. distr.**: Dobruja, Arm.-Kurd., Iran. Described from Derbent. Type in London.

2. A. **schoberioides** Kunth, Enum. V (1850) 70.— A. Sieboldi Maxim. Primit. Fl. Amur. (1859) 287.— A. parviflorus Turcz. Fl. baic.-dah. II (1856) 226.— A. Wrightii Asa Gray, Bot. Jap. (1858–59) 413.— A. micranthus Sieb. et Zucc. Pl. Jap. exs. a. 1843 (non Lindl?).— A. sessiliflorus H. Oett. in Acta Horti Jur. VI, 2 (1905) 81.— Ic.: Icon. Pl. Nipp. VII (1910) t. 1, 2.— Exs.: Sieb. et Zucc. Pl. Japon. an. 1843.

Perennial; stem 40–120 cm long, erect, branched, distinctly striated; branches spreading but set an acute angle, angled; stem and branches smooth; cladodes on the stem in clusters of 3–6, on the branches in fascicles of 2 or 3, arising at a right angle, falcate, 0.5–2 mm long, somewhat compressed, always 3-angled, the angles nearly smooth, acute; scalelike leaves on young branches obsolescent, on old branches spurless or gibbous below; flowers subsessile in clusters of several, on the main stem and on branches of first order; pedicels shorter than perianth, jointed above the middle; perianth 2–3 mm long, cupuliform-campanulate, yellowish-brown, the segments distinct nearly down to base; anthers small,

subspherical, shorter than filaments; berries red, 5–6 mm in diameter, subsessile. June. (Plate XXV, Figure 7, 7a).

Deciduous woods, shrub thickets, and meadows. – E. Siberia: Dau. (E.); Far East: Ze.-Bu., Uss., Sakh. Gen. distr.: Jap.-Ch. Described from Java.

Note. The author has not seen the original specimen, described by Kunth from Zollinger's Java collections, and doubts whether the same
429 species occurs in the USSR, in Japan, and in Java. It would perhaps be safer to use the name A. parviflorus Turcz.

Section 2. NEOASPARAGUS Iljin (stirps A. officinales et strips A. verticillati Baker l. c.). — Cladodes terete, flattened or irregularly angled. A phylogenetically younger section.

Subsection 1. SPHAERANTHERI Iljin. — Anthers spherical; filaments several times the length of anther.

3. A. **tenuifolius** Lam. Encycl. I (1783) 204; Ldb. Fl. Ross. IV, 196; Shmal'g., Fl. II, 478. — A. silvaticus Waldst. et Kit. Pl. rar. Hung. III, t. 201 (1812) 223. — A. officinalis L. Sp. pl. (1753) 313, non L. (1755). — Ic.: Rchb. Ic. Fl. Germ. X, tab. 519, Figure 969. — Exs.: F. Schultz, Herb. norm. No. 2266.

Perennial; stem 30–100 cm long, erect; branches very slender, smooth, mostly spreading at a right angle; cladodes thin, setiform or filiform, 0.1–0.2 mm in diameter, 1–4 mm long, in clusters of 10–40, more or less spreading, glabrous, smooth; scalelike leaves hyaline, spurless or on thicker stems short-spurred; flowers 1 or 2, terminal; pedicels long, jointed; perianth 6–8 mm long, whitish, green-tipped; stamens much shorter than perianth; anthers spherical, one-fourth the length of filament; berry large, to 10 mm in diameter. May-June. (Plate XXV, Figure 3 and 3a).

Groves and scrub. — European part: Bl., M. Dnp., U. Dnp. (S.), Crim. (?). Gen. distr.: Med., Bal.-As. Min. Described from S. France.

Subsection 2. LEPTANTHERI Iljin. — Anthers oblong or oblong-ovaloid, equal, longer or but slightly shorter than filaments.

Series 1. **Aphylli** Iljin. — Cladodes absent.

4. **A. turkestanicus** M. Pop., O. rast. gor Sultan-Uiz-Dag (1915) 16. — Ic.: M. Pop. l. c. t. 5 and 6.

Perennial; stems 50–80 cm long, erect, much branched; branches at an acute angle, angled; cladodes absent; scalelike leaves whitish-hyaline, perlucid, spurless; flowers solitary or paired, especially on branches of last order borne right up to summit; pedicels straight, 2–6 mm long, jointed just below the flower; perianth of staminate flowers 4–5 mm long, narrowly campanulate-funnelform, whitish with green stripes; anthers

oblong, shorter than filaments; perianth of pistillate flowers ca. 3 mm long, broader, the lobes coriaceous on the back; ovary with sessile stigma; berry blackish, 4–6 mm long, rounded-ovaloid to subglobose, beaked. May.
430 Sands and gravelly soils. — Centr. Asia: Ar.-Casp. (Bish-Arak), Kyz. K. Endemic. Described from Sultan-Uiz-Dag area. Type in Leningrad.

5. **A. Popovii** Iljin. sp. nov in Addenda III, p. 745.

Perennial; stem 50–80 cm long, divaricately branched; branches strongly spreading although mostly arising at an acute angle, terete, glabrous, smooth; cladodes none; scalelike leave white-hyaline, subpellucid, not spurred; pedicels 10–15 mm long, jointed just below the flower, mostly nodding; flowers solitary or paired at the crotches of the stem and up to the summit on branches of last order; perianth of pistillate flowers 3–4 mm long, cupuliform-campanulate, the persistent segments coriaceous on the back, and pellucid-hyaline; ovary with sessile stigma; berry rounded-ovaloid to ovaloid, acute at the top, 5–7 mm in diameter. May. (Plate XXV, Figure 10).

Sandy, pebbly-sandy, and stony places. — Centr. Asia: Mtn. Turkm. (Balkhan ranges), Kara L. Endemic. Described from Balkhan ranges. Type in Leningrad.

Series **Foliati** Iljin. — Cladodes always present.

6. **A. bucharicus** Iljin. sp. nova in Addenda III, p. 746.

Perennial; grayish-green; stem 30–60 cm long; branches arising at a right or nearly right angle; cladodes in fascicles of 10–40, particularly numerous on main stem, very thin, 0.25–0.3 mm in diameter, 5–12 mm long, mostly somewhat falcate, divaricate in fascicle, densely covered with rather soft somewhat crisp short hairs; branches and upper part of stem similarly vested (Figure 6); scalelike leaves brownish-hyaline, the spur scarcely developed; flowers solitary or paired; pedicels 10–20 mm long, jointed below the flower; perianth of staminate flowers 4–5 mm long, campanulate, purplish-tinged; anthers oblong, longer than filaments; perianth of pistillate flowers smaller, 2–2.5 mm long; berry ca. 7–8 mm in diameter. (Plate XXV, Figure 6).

Stony mountain slopes. — Centr. Asia: Pam.-Al. (Kulyab, Darvaz, Gissar). Endemic. Described from vicinity of village of Arzanchi in Kulyab. Type in Leningrad.

7. **A. neglectus** Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 48. — A. officinalis β gracilis Ldb. Fl. Alt. II (1830) 43. — A. trichophyllus α trichophyllus Bong. et Mey., Suppl. Fl. Alt. (1841) 74. — A. trichophyllus var. gracilis Trautv., A. trichhophyllus β glaber, cladodiis tenuisimis rectis Ldb. Fl. Ross. IV (1853) 197.

Perennial; stem long, often up to 150 cm, the lower part with whitish hyaline periderm projecting in narrow oblong stripes, the upper part
431 flexuous, with branches arising at a right angle; cladodes numerous, mostly in fascicles of 10–25, on the terminal branches rarely reaching 5 in number, on the main stem very dense, 20–75 in fascicle, persistent all

along the stem in the form of characteristic dense rosettes; all cladodes mostly subdivaricate, commonly very slightly curved, rarely straight, mostly 5 (3)–20 mm long, very rarely to 40 mm (f. longifolia Iljin), thin, often capillary, 0.25 (0.125)–0.5 mm long, smooth; scalelike leaves hyaline; spurs well developed, fairly long, on lower part of stem often very prickly; flowers solitary or paired, on main stem and on branches of first order; pedicels commonly 10 (7)–20 (25) mm long, jointed near the flower; perianth of staminate flower narrowly funnelform-campanulate, 5–7 mm long, the oblong-ovaloid anthers shorter than filaments; perianth of pistillate flowers ca. 3 mm long; berry globose, 6–7 mm long, red. May. (Plate XXV, Figure 11).

Shrub thickets (caragan, wild rose, etc.), bottomlands, shaded river canyons, mountain valleys and ravines. — W. Siberia: Alt.; Centr. Asia: Ar.-Casp. (Ulu-tau mountains), Dzu.-Tarb., T. Sh., Pam.-Al. Gen. distr.: Dzu.-Kash., Ind.-Him. (Pamirs). Described from Kurchum in S. Altai. Type in Leningrad.

Note. This species is represented through its distribution area by various as yet unidentified races. The typical race, i.e., A. neglectus Kar. et Kir. proper, occurs in Tarbagatai, Dzungarian Ala Tau and Tien Shan. In the Pamir-Alai are already encountered somewhat divergent forms with longer leaves and slight tubercles on the branches and at the base of cladodes. These forms are in need of further study with a view to determination of the more southerly forms.

8. **A. Misczenkoi** Iljin sp. nova in Addenda III, p. 746.

Perennial; stem twining, with divaricate flexuous branches; at the base of branches of first order branches of second order on either side and fascicles of cladodes; cladodes 4–10 in fascicle, 10–25 mm long, thin, ca. 0.25 mm long, somewhat falcate and strongly divaricate; stems, branches and cladodes smooth; scalelike leaves long-spurred; pedicels 8–12 mm long, jointed well above the middle, inserted in terminal crotches of branches of first order (no flowers on the main stem); berry globose, 6–7 mm long, blackish-red. — E. Siberia: Dau. (Kyakhta). Endemic. Described from vicinity of Kyakhta. Type in Leningrad.

9. **A. Breslerianus** Schult. Syst. VII (1830) 323. — A. triglochideus Pall. Manuscr. [sec. Miscz. Aspar. (1916) 33]. — A. verticillatus var. trichophyllus Bresl. Diss. No. 27 (sec. Kunth. Enum. V, 1850, 70). — A. maritimus var. Breslerianus Boiss. Fl. Or. V (1875) 337. — A. maritimus var. Breslerianus f. breviceps Bornm. et Sint. in herb.; Miscz. Aspar. (1916) 33. — A. maritimus auct. plur.
432 ross. (non Miscz. et Pall.). — Ic.: Fl. Yugo-Vost. III, 400, c. 195; Mishchenko, l.c. 32, p. 4. — Exs.: Songor. No. 2005; Szovitz, Pl. pers. No. 423.

Perennial; stem 15–40 cm long, somewhat geniculately bent, with numerous long prostrate branches; cladodes short, thick, subulate, prickly, divaricate, mostly 3 (1–6) in fascicle, commonly ca. 1 cm (0.5–2 cm) long; branches and cladodes cartilaginous-denticulate; pedicels very short (flowers apparently sessile), shorter than perianth; perianth of staminate flowers narrowly campanulate, 2–3 mm long; anthers ovaloid-oblong, shorter than filaments; berry globose, ca. 6 mm long, subsessile, soon turning black. June. (Plate XXV, Figure 4).

Solonchaks, seacoasts, and rarely on chalk. — European part: L. V.; Caucasus: Cisc., Dag., E. and S. Transc.; Centr. Asia: Ar.-Casp., Kara K., Kyz. K., Mtn. Turkm. (Balkhan ranges). **Gen. distr.**: Arm., Kurd. Described from Iran?

10. **A. angulofractus** Iljin sp. nova in Addenda III, p. 746.

Perennial, 30–80 cm tall, mostly yellowish-green, smooth throughout; stem and branches distinctly zigzag or geniculately bent; cladodes 1–4 in fascicle, 1–1.5 mm long, mostly 10 (5)–45 mm long, descending and forming an obtuse axil; scalelike leaves hyaline, obscurely spurred; flowers mostly in pairs, on main axis and on branches of first order; pedicels of staminate flowers shorter than perianth; pedicels of pistillate flowers as long as perianth, elongating in fruit to 5–6 mm; perianth of staminate flowers narrowly campanulate, yellowish, at base brownish, 5–6 mm long, the pedicels jointed mostly above or rarely at or below the middle; pistillate perianth 3–3.5 mm long, cup-shaped, the pedicels jointed near the flower; anthers oblong, shorter than filaments; berry spherical, 6–8 mm long, red, scarcely turning black. May. (Plate XXV, Figure 5).

Sands, rarely takyrs.—Centr. Asia: **Gen. distr.**: Dzu.-Kash. Described from the sands of the Ili River. Type in Leningrad.

11. A. soongoricus Iljin sp. nova in Addenda III, p. 747.—A. Ledebourii Kryl., in Fl. Zap. Sib. III (1929) 650 (non Miscz.).—A. maritimus Ldb. Fl. Alt. II (1820) 44, non Mill. et Pall.—Ic.: Ldb. Ic. pl. Fl. Ross. IV, t. 393.

Perennial, broadly shrubby, 20–60 cm tall, divaricately branched; branches horizontally spreading; cladodes absent, in lower part of branches, unequal, commonly in fascicles of 3–10, rarely the terminal solitary or
433 paired, mostly slightly falcate or straight, divaricate, like other parts of the plant smooth, thickish, mostly 1–5 mm long and 1–1.5 mm in diameter, obscurely spurred or spurless; flowers in 2's to 4's on the main stem and on branches of first order; pedicels short, jointed at or just above the middle, shorter than perianth; perianth of staminate flowers 6–7 mm long; anthers ovaloid-oblong, shorter than filaments; berry spherical, ca. 7 mm in diameter, red. May-June. (Plate XXV, Figure 1).

Sandy and sandy-clay soils, in mountains among sands. — Centr. Asia: Balkh. **Gen. distr.**: Dzu.-Kash.

Note. Mishchenko, in his review of Crimean and Caucasian asparaguses, makes the assumption that Ledebour's drawing was based on Caucasian specimens, since they resemble these plants more closely. It is impossible to agree with this assumption as Ledebour clearly indicates the provenience of his original plant from the valley of the Irtysh River. Asparaguses that show perfect resemblance to Ledebour's illustration do in fact grow in Zaisan and in the Lake Balkhash area. As regards the species described by Mishchenko under the name A. Ledebourii Miscz., this is synonymous with A. persicus Baker.

12. **A. tuberculatus** Bge in sched. herb. Horti Bot. Petr.; descr. in Addenda III, p. 747.

Perennial; stem 30–75 cm long, erect, smooth and mostly milky-white at base, elsewhere prominently striated or lined with longitudinal tubercles, divaricately branched; branches mostly arising at a right angle, lined with

longitudinal tubercles, divaricately branched; branches mostly arising at a right angle, lined with small cartilaginous tubercles, sometimes interruptedly so; cladodes mostly in fascicles of 4–8, unequal, 0.5–5 mm long, rarely the terminal solitary, divaricate, often arched, striated, covered chiefly in lower part with small cartilaginous tubercles; scalelike leaves hyaline, spurless on the branches, obscurely spurred on the stem; flowers mostly in pairs, on the main stem and on branches of the first and often the second order; pedicels relatively short, equal, slightly shorter to slightly longer than perianth, jointed at or just above the middle; perianth of staminate flowers 5–6 mm long, the segments distinct to two-thirds the length; anthers oblong, longer than filaments; berry spherical, 7–8 mm long, red, becoming blackish-brown. June-July.

Gravelly steppes, rocks, and sands. — E. Siberia: Dau. Gen. distr.: Mong., Jap.-Ch. Described from Mongolia. Type in Leningrad.

13. **A. dahuricus** Fisch. (Hort. Gorenk.); Link, Enum. S. (1821) 340; Turcz. Fl. baic.-dah. II, 226 (p. p.); Ldb. Fl. Ross. IV, 198 (p. p.).

Perennial; stem 30–80 cm long, erect, prominently striated, branched; branches strongly spreading but arising at an acute angle; branches and cladodes smooth; cladodes mostly equal, 2–7 mm long, in fascicles of 1–3 (rarely up to 6), on the upper part of branches of last order always
434 solitary, set an acute angle; scalelike leaves linear, spurless or on the main stem gibbous; flowers commonly in pairs, on the main stem and on branches of the first and second order; pedicels slightly shorter to slightly longer than perianth, jointed at or slightly below or above the middle; perianth of staminate flowers 4–5 mm long, the segments distinct to three-quarters the length; anthers oblong, shorter than filaments; perianth of pistillate flowers 2–3 mm long; berry spherical, 5–7 mm long, at first red, becoming nearly black in maturity. June.

Gravelly steppes, stony slopes, rocks, and rarely sandy soils or fallows. — E. Siberia: Dau.; Far East: Ze.-Bu. Gen. distr.: Mongolia, Manchuria. Described from Dauria. Type in Leningrad.

14. **A. kasakstanicus** Iljin sp. nova in Addenda III, p. 747. — A. inderiensis Miscz., Pacz., Schmalh. etc., non Blume. — A. maritimus Korsh. etc., non Mill. et Pall. — A. litoralis Iljin, Fl. Yugo-Vost. III (1929) 398 (non Stev.).

Perennial, 20–50 cm tall, yellowish-green; stem erect or bent at the joints, nodding or flexuous at the end, branched; branches arising at an acute or rarely straight angle; cladodes and mostly the branches cartilaginously tuberculate-denticulate, very rarely smooth (subsp. gypsaceus Iljin), often here and there irregularly thickened, mostly flattened, on the average 3–4 (-6) cm long and 0.75–1 mm broad, in fascicles of 1–6, mostly 3, straight or irregularly flexuous, commonly unequal, appressed to branches or set an acute angle; scalelike leaves mostly spurless or obscurely spurred; flowers on the main axis and on the lower part of branches of first order; pedicels long, jointed above the middle; perianth 4–6 mm long, yellowish; anthers oblong, shorter than filaments; berry spherical, red, 6–7 mm long. May.

Solonchaks, sands, and chalk outcrops. — European part: L. V., Crim., Centr. Asia: Ar.-Casp. Endemic. Described from vicinity of Lake Inder. Type in Leningrad.

Plate XXV

1. A. soongoricus Iljin.– 2. A. brachyphyllus Turcz., 2a) a fascicle of cladodes.– 3. A. tenuifolius Lam., 3a) stamen.– 4. A. Breslerianus Schult.– 5. A. angulofractus Iljin.– 6. A. bucharicus Iljin.– 7. A. schoberioides Kunth; a) a portion of cladode.– 8. A. polyphyllus Stev.– 9. A. pseudoscaber Grecescu.– 10. A. Popovii Iljin.– 11. A. neglectus Kar. et Kir.

Note. In his publication "Rastit. Emb. kotloviny" (Vegetation of the Emba Depression), the author proved that it was this species that Steven had in mind while describing A. litoralis Stev. He based my conclusion on the original specimen from the vicinity of Sudak, even though this had not been mentioned on the label. Subsequently, when Steven's collections arrived in the Komarov Botanical Institute, an Asparagus species, also derived from Sudak, was found there with Steven's own determination —
437 A. litoralis, practically conforming to the description provided by P. Mishchenko in his review of Crimean and Caucasian asparaguses. Thus, while retaining the name A. litoralis Stev. for the rupestral Crimean species, the author is obliged to apply to the eastern species the new name A. kasakstanicus Iljin.

15. **A. brachyphyllus** Turcz. in Bull. Soc. Nat. Mosc. XIII (1840) 78; Shmal'g., Fl. II, 479. — A. purpurascens M.B. in Kunth Enum. V (1850) 63 (nomen nudum, sub synon.). — A. officinalis var. flexuosus Ldb. Fl. Alt. II (1830) 44 (p.p.). — A. trichophyllis γ trachyphyllus Bong. et Mey. Suppl. Fl. Alt. (1841) 74. — A. trichophyllus var. flexuous Traut. in Bull. Soc. Nat. Mosc. XL (1867) 109. — A. trichophyllus δ tuberculato-scaber, cladodiis setaceis arcuatis brevioribus longitudine inaequalibus, Ldb. Fl. Ross. IV (1853) 197. — A. trichophyllus var. crassifolius Trautv. in herb. — A. maritimus Pall. (?) It. II (1773) 329 et auct. — A. vulgaris var. maritima Pall. ex Bong. et May. l.c. 74. — A. Pallasi Miscz., Monit. Jard. Tifl. XII (1916) 27; Kryl., Fl. Zap. Sib. III, 649. — Ic.: Fl. Yugo-Vost. III (1929) 194; Miscz. l.c. p. 29, Figure 3.

Perennial; stem 15–50 cm long, flexuous, often trailing and twining; branches arising mostly at a right or rarely at an acute angle, often arched, sporadically minutely cartilaginous-tuberculate; cladodes in fascicles of 4–10, mostly 10 (3–20) mm long and 0.5–0.75 mm broad, commonly falcate and spreading, with very numerous or scattered cartilaginous tubercles; scalelike leaves spurred; flowers borne on the main axis and on the branches; pedicels 5–10 mm long, jointed near the flower or at least well above the middle; perianth of staminate flowers narrowly funnelform, 4.5–6 mm long, mostly reddish; anthers oblong, shorter than filaments; perianth of pistillate flowers 2–3.5 mm long, broadly funnelform, pink; berry spherical, red, 5–7 mm in diameter. May. (Plate XXV, Figure 2, a).

Solonchaks, saline meadows, and seacoasts. — European part: Bl., L.V.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D., Kara K., Amu D. Gen. distr.: N. China. Type in Leningrad

Note. An exceedingly polymorphic species, with a vast distribution area. P. Mishchenko, in his critical review of Crimean and Caucasian asparaguses, considers the European specimens as a distinct species and separates them from the original A. brachyphyllus Turcz. chiefly by the number and length of cladodes. This character is not, however, persistent anywhere and displays variability over the entire range throughout the distribution area. The author does not find it possible to separate the western and eastern plants as distinct species. Moreover, if a wider conception of species is applied, the species now to be described,

438 A. persicus Baker, could be included within the framework of the same species, a course actually adopted by M. G. Popov in the Flora of Turkmenistan.

16. **A. persicus** Baker (s.l.) in Journ. Linn. Soc. XIV (1875) 603.— A. oligophyllus Baker, l.c. 604.— A. Ledebourii Miscz. in Bull. Jard. Bot. TifI. XII (1916) 31.— A. inderiensis Blume in herb. (authent.) et Iljin in Fl. austro-orient. III (1929) 397, non Pacz. et Miscz.— A. oligocladus Bornm. et Sint. in herb.— A. officinalis var. decorticatus Ldb. Fl. Alt. II (1830) 43 (p.p.).— A. trichophyllus var. decorticatus Trautv. in herb.— A. trichophyllus β. glaber cladodiis setaceis arcuatis, Ldb. Fl. Ross. IV (1853) 197 (p.p.).— A. leptophyllus Schischk., Izv. Tomsk. Univ. LXXX (1929) 434.— Exs.: Kotschy, Pl. Pers. bor. No. 365.

Perennial; stems glabrous, smooth, commonly flexuous, often entwining surrounding plants, mostly angled and strongly branched; branches arising at a right angle or even pendent; cladodes mostly in fascicles of 1–5 (8), mostly unequal, 1–5 cm (usually 1.5–2 cm) long, slightly falcate or more often straight and spreading at a right angle, rarely ascending or descending, very thin or thickish; smooth; scalelike leaves commonly spurred; flowers on the main axis and on the branches; pedicels rather long, jointed (mostly considerably) above the middle; berry spherical, red, 6–7 mm long. May.

Saline meadows and meadow solonchaks, tugaic thickets, shore thickets in canyons, and chalk outcrops.— European part: L. V.; Caucasus: E. Transc.; W. Siberia: U. Tob., Irt.; E. Siberia: Ang.-Say. (Minusinsk-Achinsk steppes); Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Syr D., Amu D., Kara K., Mtn. Turkm. **Gen. distr.**: Arm.-Kurd., Dzu.-Kash. Described from N. Iran, vicinity of village of Ask, near Demavend. Cotype in Leningrad.

Note. A. persicus Baker is presented here as a collective species. This is one of the most polymorphic species of Asparagus, containing a large number of minor species and local races, some already described, the majority as yet unknown. A. Ledebourii Miscz., A. inderiensis Blume, A. oligocladus Bornm. et Sint. and A. leptophyllus Schischk. are clearly not synonyms but already described minor species of this cycle. Thus, for instance, the characteristics distinguishing these forms from the true A. persicus Baker are, in the case of A. Ledebourii Miscz., the longer and thicker cladodes; in the case of A. inderiensis Blume, the more numerous and mostly somewhat curved cladodes; A. oligocladus Bornm. et Sint. is distinguished by the mostly somewhat descending usually and almost solitary cladodes; A. leptophyllus Schischk. differs in the more numerous (4–8), longer and more slender cladodes. The herbarium material suggests that there are other species of the same standing. There is no doubt that this cycle of species, unified
439 here under the name A. persicus, needs to be subjected to detailed monographic study before it can be brought into an orderly system adaptable to practical use.

17. **A. pseudoscaber** Grecescu, Consp. fl. Rom. (1898) 556.— A. officinalis b. pseudoscaber Asch. u. Gr. Syn. III (1905) p. 295.— A. scaber Pacz. Schmalh. (p.p.); Mat. dlya Fl. Bess. (1912) 78 (non Briq.).

Perennial; branches often horizontal, scabrous due to cartilaginous tubercles, very rarely nearly smooth; stem in upper part and branches mostly flexuous; cladodes in fascicles of 6–20, 4–10 mm long, spreading, sulcate, straight or rarely very slightly curved, smooth; scalelike leaves distinctly but slightly spurred; flowers nodding; pedicels ca. 20 mm long, jointed in upper part; perianth of staminate flowers 5–6 mm long, cylindric-campanulate, yellowish-green, brownish below; anthers oblong, as long as or shorter than filaments; perianth of pistillate flowers ca. 3 mm long, cup-shaped to funnelform; berry spherical, 7–8 mm long, May-June. (Plate XXV, Figure 9).

Flooded areas and floodplains. — European part: Bl. Gen. distr.: Rumania. Described from Rumania, from the Cranguri area of Prahova District. Type in Bucharest.

18. **A. Levinae** Klok. in Tr. Sil.-Gosp. Bot. I, 3 (1927) 171.

Perennial; stem 20–75 cm long, densely longitudinally striate except at base; branches more or less obliquely ascending to subhorizontal, scabrous due to small tubercles; cladodes 5–50 mm long, in fascicles of 4–10, relatively thin, 0.25–0.5 in diameter, striated and often tuberculate-scabrous to nearly smooth, slightly spreading subappressed; scalelike leaves essentially spurless; staminate flowers 5–6 mm long; pedicels 7–12 mm long, jointed above the middle; berry spherical, 5–6 mm long, red.

Sandy shores of seas and brackish lakes. — European part: Bl. (Dolgii, Dzharylgach and Biryuchii islands), Crim. (Lakes Donuzlovskoe and Sasykskoe, mouth of Bol'shoi Karasu River). Endemic. Described from Dolgii Island. Type in Kharkov; cotype in Leningrad.

Note. Specimens from the Crimea have shorter cladodes than those from Dolgii and Dzharylgach islands (var. tauricus Iljin). It is possible that they represent distinct races. The author has not seen the flowers.

19. **A. officinalis** L. Fl. Suec. ed. 2 (1755) 108; Ldb. Fl. Ross. IV, 196; Shmal'g., Fl. II, 478; Kryl., Fl. Zap. Sib. III, 645. — A. altilis Aschers. Fl. Prov. Brand. I (1864) 730. — A. officinalis var. altilis*
440 L. Sp. pl. (1753) 313. — A. hortensis Mill. Gard. Dict. ed. 8, No. 1 (1768). — Ic.: Rchb. Ic. Fl. Germ. X, tab. 518, 967. — Exs.: Herb. Mus. Tirol. No. 629.

Perennial; stem 50–150 cm long, erect, smooth, branched; branches arising at an acute angle; cladodes in fascicles of 3–6, slender, straight, filiform, 1–3 cm long, obliquely ascending or more or less appressed to stem; scalelike leaves spurred; flowers solitary or paired, borne on main axis and on branches; pedicels rather long, jointed slightly below to slightly above the middle; perianth segments oblong; staminate flowers ca. 5 mm long; anthers about the length of filaments; pistillate flowers half as long as the staminate; berry spherical, red. May-July.

Meadows, northern steppes, and shrub thickets. — Throughout Europe, except the north; Caucasus: Cisc., Tal.; W. Siberia: U. Tob., Irt., Alt. **Gen. distr.**: Scand., Atl. Eur., Centr. Eur., Balk.

Note. The relationship between this species and A. polyphyllus Stev. is not quite clear, and thus, contrary to Mishchenko's opinion, their unification is fully justified. It is possible that A. hebecarpus Andrz.,

* The epithet altilis, signifying fat, was adopted by Linnaeus for the cultivated asparagus.

of which the author has not seen the original specimens, is one of the forms of this species. It is referred by Baker to A. caspius Hohen.

Economic importance. Var. altilis L. is cultivated as a truck crop, the young shoots of the cultivated form being used (April-June) as a vegetable. They contain asparagin and also have a diuretic effect.

20. **A. setiformis** Kryl. in Animadvers. Syst. ex Herb. Un. Tomsk. No. 9 (1928) 20; Fl. Zap. Sib. III (1929) 648.

Perennial; stem 60–100 cm long; branches obliquely ascending or spreading; cladodes in fascicles of 2–6 (8), capillary, 1.5–3.5 cm long, 0.125–0.2 mm in diameter, straight, mostly divaricate; pedicels 10–15 mm long, jointed at or just above the middle; perianth of staminate flowers funnelform-campanulate, ca. 4 mm long; anthers oblong-ovaloid, slightly shorter than filaments; berry spherical, 6–7 mm long, dark red. June.

Meadows. — W. Siberia: Irt., Atl. Described from W. Altai, the first report indicating the vicinity of town of Kolyvan. Type in Tomsk.

Note. The author has not had an opportunity of seeing specimens of this species. As far as can be deduced from the description, two different species appear to be confused here: 1) var. typicus Kryl l.c. — obviously belonging to A. persicus, and 2) var. tenuis Kryl. l.c. which is one of the shade-loving forms of A. officinalis L. This assumption needs confirmation.

21. A. **caspius** Hohen. Enum. Talysch. (1837) 24. — A. davuricus Ldb. Fl. Ross, IV (1853) 198 (p.p.). — A. offinicalis var. strictus
441 Boiss. Fl. Or. V (1884) 336 (p.p.). — A. oxycarpus Stev. in Bull. Soc. Nat. Mosc. XXX (1857) 344. — A. officinalis var. divaricatus Iljin, Fl. Yugo-Vost. III (1929) 397.

Perennial, glaucescent; stem relatively long, longitudinally striate, much branched; branches mostly strongly spreading; cladodes in fascicles of 5 (3)–15, slender, not more than 0.5 mm in diameter, commonly equal, 10–30 mm long, straight, divaricate, striate, smooth or scabrous (var. oxycarpus Miscz.); scalelike leaves long-spurred; flowers on main stem and on branches; pedicels 8–15 mm long, jointed at or slightly above the middle; perianth of staminate flowers ca. 6–7 mm long; anthers ovaloid-oblong, shorter than filaments; perianth of pistillate flowers small; berry 6–8 mm long, spherical to ovaloid-spherical, red. May-June.

Groves, woods, gardens, and slopes. — Caucasus: Dag., W., S. and E. Transc.; Centr. Asia: Ar.-Casp. Gen. distr.: Arm.-Kurd. (?). Described from Transcaucasia, from vicinity of German colony of Elenendorf. Type in Leningrad.

Note. The distinguishing characteristics hardly justify separation of this species from A. officinalis that is insisted upon by P. Mishchenko. Postponing the final solution of this problem until a thorough systematic study has been carried out, the author presents this species within the scope proposed by Mishchenko.

22. A. **oligoclonos** Maxim. Primit. fl. Amur. (1859) 286.

Perennial; stem 40–75 cm long, erect, branched; branches arising at an acute angle; stem in upper part and branches prominently striate, the striations scarcely denticulate; cladodes in fascicles of 8–15 on the stem

and 5–10 on branches, 1 (0.5)–2.5 cm long, straight, mostly flabellately spreading, deeply striate; scalelike leaves spurless, on the main stem short-spurred; flowers mostly in pairs; pedicels very long, pendulous, commonly jointed above the middle; perianth of staminate flowers 7–10 mm long; anthers oblong, longer than filaments; berry spherical, 8–10 mm long, red. June-July.

Dry meadows, dry stony slopes, and coastal sands. — E. Siberia: Dau.; Far East: Ze.-Bu., Uss. Gen. distr.: Jap.-Ch. Described from the estuary of the Onon River. Type in Leningrad.

23. A. **polyphyllus** Stev. in Bull. Soc. Nat. Mosc. XXX (1857) 343. — A. officinalis var. serotinus C. Koch. in Linnaea XXII (1848) 265. — A. officinalis var. strictus Boiss. Fl. Or. V (1888) 336 (p. p.). — A. officinalis var. caspicus Asch. et Graeb. Synops. III (1905–7) 295 (p. p.). — A. officinalis β. brevifolius Trautv. in Shmal'g., Fl. II (1897) 478. — A. officinalis var. jergenicus Racz., Flor. i fit. issl. v Kalm'shch. st. (1892) 123. — Exs.: Callier. It. taur. III No. 799.

442 Perennial; stems 30–50 cm long, erect, glabrous, smooth, branched, often angled; branches arising at an acute angle; cladodes fairly thick, 0.25–1.5 cm long, appressed to stem or slightly spreading; scalelike leaves spurred; flowers on the main axis and on the branches; pedicels rather long, jointed slightly below to slightly above the middle; berry smaller than in the preceding species. May-July. (Plate XXV, Figure 8).

Steppes, solonetz soils, and chalk outcrops. — European part: Caucasus; W. Siberia: U. Tob.; Irt., Alt.; E. Siberia: Ang.-Say. (Irba); Centr. Asia: Ar.-Casp. (N.) and Balkh. (N.). Gen. distr.: not ascertained. Described from the Crimea, from the vicinity of Sudak. Type in Leningrad.

Note. Most closely related to A. officinalis L., from which it differs in trivial characters and possibly constitutes a southern variety of this species. The author retains within the framework established by P. Mishchenko.

24. **A. litoralis** Stev. in Bull. Soc. Nat. Mosc. XXX (1857) 344; Miscz. Aspar. (1916) 34.

Perennial; stem 30–50 cm long, slightly sulcate and angled, smooth, mostly flexuous in upper part, divaricately branched; branches smooth, arising at a straight or nearly straight angle; cladodes in fascicles of 4–10, 5–10 mm long, rarely 1.5 mm [?], straight or slightly curved, spreading, smooth; scalelike leaves slightly spurred; flowers in 2's–4's, borne on the main axis and on branches of first order; pedicels long, jointed in upper part; perianth of staminate flowers campanulate, 5–6 mm long; anthers oblong, about the length of filaments; perianth of pistillate flowers ca. 3 mm long; berry spherical, 7–8 mm long, red. May-June.

Rocky seacoasts. — European part: Crimea. Endemic.

Genus 285. **DANAË*** MEDIC.**

Medic. Malvenfam. (1787) 72.

Flowers bisexual; perianth fleshy, gamophyllous, urceolate, with small deltoid equal teeth; stamens 3, the filaments united into a tube, the anthers

* A mythological name.

** Arranged by E.G. Chernyakovskaya.

exserted; ovary sessile, incompletely 3-locular, the locules 2-ovuled; style short; stigma capitate; berry spherical, mostly 1-seeded. Subshrubs resembling Ruscus, with lanceolate phylloclade, but with gamophyllous flowers in terminal racemes.

443 1. **D. racemosa** (L.) Moench, Method. (1794) 179. — Ruscus racemosus L. Sp. pl. (1753) 1041. — Ic.: Geartn. Carpol. tab. 16, Figure 8; Dippel, Laubholzk. I, 11, Figure 6.

A perennial, evergreen, branched subshrub, 1/2–1 m tall, with erect branches; cladodes obliquely oblong-lanceolate, 5–6 (8.5) cm long, 1.5–2 cm broad, acuminate; flowers small, white, in terminal racemes of 6–9 arising from axils of upper cladodes; pedicels barely shorter than the flowers, jointed at the end; berry large, red. Fl. May-July. Fr. October. (Plate XXVI, Figure 5 a–d).

Shaded woods. — Caucasus: Tal. (up to 1000 m above sea level).

Gen. distr.: Syria and N. Iran (coast of Caspian Sea, Gilan and Astrabad).

Note. In the Caucasus the local population uses this plant as a laxative and as an infusion against colds. Introduced into cultivation as ornamental (Grossg., Obsled. efiron. i lek. r. ASSR. Bot. Sb. AZGNI, 1932).

Genus 286. **RUSCUS*** TOURN.**

Tourn. Inst. 79 tab. 15.

Perennial, dioecious, erect subshrubs, with creeping rhizome and finely sulcate stem; branches transformed into persistent coriaceous sessile prominently parallel-nerved cladodes; leaves small, hyaline, triangular-subulate; flowers bisexual [sic], small, with a greenish perianth, developing from a bud inserted on the midrib on the upper or rarely the lower face of the cladode; perianth marcescent, 6-parted; perianth segments spreading, the inner narrower; flowers staminate consisting of stamens connate into an ovoid tubule terminating in fertile anthers; pistillate flower consisting of a short-stipitate ovary surrounded by filaments destitute of anthers; ovary 3-loculed, the locules 2-ovuled; style very short; stigma capitate; fruit a fleshy red short-stipitate berry, mostly 1-celled and 1-seeded, rarely 2-seeded. Seed subglobose.

1. Cladodes large, green, 5–12 cm long, 12–40 mm broad . . . . . 2.
+ Cladodes small, firm, terminating in a spiny point . . . . . 3.
2. Flowers 5 or 6, on the lower face of cladodes, subtended by a small hyaline obtusely lanceolate bract. . . . . 1. **R. hypophyllum** L.
+ Flowers 3–5, on the upper face of cladodes, subtended by a large
444 foliaceous bract . . . . . 2. **R. hypoglossum** L.
3. Branches alternate; flowers 1 or 2 . . . . . 3. **R. ponticus** Woron.
+ Branches 4–5, apparently verticillate at the end of stem; flowers in clusters of 2–5 . . . . . 4. **R. hyrcanus** Woron

1. **R. hypophyllum** L. Sp. pl. (1753) 1041. — Ic.: Bot. Mag. tab. 2049.

* The name of this plant, as mentioned by Virgil and Pliny.

** Arranged by E.G. Chernyakovskaya.

Perennial; a subshrub, 45–55 cm tall; stems erect, mostly simple; cladodes dense, very large, coriaceous, oblong to oblong-lanceolate, 6–9 cm long, 2–4 cm broad, acuminate, narrowed toward base, the lower opposite, the upper alternate; flowers 5 or 6, small, borne on the lower face of the cladode and subtended by a small lanceolate obtusish bracts; berries stipitate, red, 8–10 mm in diameter, 2-seeded. Fl. April-May; fr. July-September. (Plate XXVI, Figure 4).

Shady woods, among shrubs in canyons, up to 1800 m above sea level.— Caucasus: Cisc., W. Transc. Gen. distr.: Med. Described from Italy.

Note. A plant varying greatly in the shape and breadth of cladodes that are up to 11 cm long and 8 cm broad.

2. **R. hypoglossum** L. Sp. pl. (1753) 1041; Shmal'g., Fl. II, 478.— Ic.: Rchb. Ic. Fl. Germ. tab. 969; Fl. graec. t. 955.

Perennial; a subshrub, 20–40 cm tall; branches erect, commonly simple; cladodes large, coriaceous, oblong to oblong-lanceolate, 5–7 cm long, 12–22 mm broad, acuminate, narrowed toward base, the upper opposite, the lower alternate; flowers in 3's to 5's, borne about the middle on the upper face of the cladode, subtended by a foliaceous coriaceous oblong-acuminate bract, up to 2–2.5 cm long and 5–8 mm broad. Fl. April-May; fr. July. (Plate XXVI, Figure 3).

Shady and stony places in the mountain and forests.— European part: S. Crim. Gen. distr.: W. Med., Centr. Eur., Bal.-As. Min. Described from Bulgaria. Type in London.

3. **R. ponticus** Woron. in schedis; Grossg., Fl. Kavk. I (1926) 240.— R. aculeatus β angustifolius Boiss. Fl. Or. V (1884) 341.— R. aculeatus Ldb. Fl. Ross. IV (1841) 129; Shmal'g., Fl. II, 477.-
447 Ic.: Monit. Jard. Tifl. (1907) tab. II (sub R. aculeatus v. angustifolius).— Exs : HFR No. 534.

Perennial; a glaucescent subshrub, 30–55 cm (up to 1 m) tall; stem erect, finely sulcate, scaberulous on the ribs; branches erect to scarcely reclinate, alternate; leaves narrowly long-subulate, hyaline, borne at the base of the cladode; cladodes firmly coriaceous, lanceolate to ovate-oblong, tapering to a spiny point, with prominent midrib and few lateral nerves; flowers small, borne on the lower half of the lower face of the cladode, subtended by a small hyaline subulate-acuminate lanceolate bract; berry large, red. Fl. February-April; fr. October-December. (Plate XXVI, Figure 1a–c).

Stony places in mountain forests, up to 900–1000 m above sea level, among shrubs and among stones, in canyons, light juniper woods, in the lower zone on the southern slopes of the main range of the Crimean Mountains and in pine woods of the Crimea; on coastal rocks and in beech woods along the Black Sea coast.— European part: Crim.; Caucasus: W. and E. Transc. Gen. distr.: Lazistan, Bal.-As. Min. Described from the Caucasus. Type in Leningrad.

Note. The size of cladodes varies from 12 to 25 mm long and from 5 to 8 mm broad. The USSR species differs from the W. European R. aculeatus in the narrower firmer and thinner acuminate 1–3-nerved cladodes.

Plate XXVI

1. Ruscus ponticus Woron.: a) pistillate flower, b) ovary in section, c) staminate flower, d) fruit, e) fruit in section.– 2. R. hyrcanus Woron.: a) ovary, b) pistillate flower.– 3. R. hypoglossum L.– 4. R. hypophyllum L.– 5. Danaë racemosa Moench.: a) fruiting branch, b) flowering branch, c) flower, d) fruit.

E. V. Wulff (Fl. Kryma I, 3, 68) reports that within its distribution area the plant is used for making whisks and is therefore subjected to severe extermination.

var. macrophyllus Woron. — with stronger growth and cladodes 3.5–4 cm long, 2 cm broad. — W. Transc. (Sukhumi and Kutaisi).

4. **R. hyrcanus** Woron. in Monit. Jard. Tifl. (1907) 33. — R. aculeatus f. verticillata Alexeenko in schedis. — Ic.: ibid. tab. 1. — Exs.: Fl. cauc. exs. No. 309.

Perennial; 25–40 cm tall; stems sulcate; branches 5, rarely 4 or 6, arising at one point at the end of stem, the lateral forming an apparent whorl, the central one apparently forming as extension of the stem, all subequal, arcuately spreading or declined; cladodes green, oblong-ovate or verticillate-elliptic [sic], rarely broadly lanceolate, 12–25 mm long, 8–13 mm broad (including point), distinctly and closely parallel-nerved, the spiny point 2–2.5 mm long, the carinate midrib very prominent; flowers commonly in clusters of 2–5, rarely solitary. Fl. April; fr. September-October. (Plate XXVI, Figure 2 a, b).

Box thickets in woods up to 1200 m above sea level. — European part: Crim. (near Yalta, Levandovskii); Caucasus: Tal. Gen. distr.: N. Iran. (Caspian coast — in woods). Described from Iran. Type in Leningrad.

448 Genus 287. **CLINTONIA*** RAF.**

Raf. Journ. d. Phys. (1819) 102.

Perianth petaloid, 6-parted down to base, deciduous, the elongated round-tipped narrow-based subequal segments spreading or campanulately approximate; stamens 6, inserted at the base of segments; anthers 2-loculed, elongate, bilobed at base; pistil with 2- or 3-celled ovary and 1 stamen; stigma obscurely 2- or 3-lobed; fruit a spherical or ovaloid 2- or 3-celled berry, the cells 2–12-seeded. Plants with leafless scape, umbellate inflorescence, and radical leaves.

1. **C. udensis** Trautv. et Mey. Flor. ochot. (1856) 92; Maxim. Prim. Fl. Amur. 278; Kom. in A. H. P. XX, 468. — Ic.: Trautv. et Mey. ibid. 30.

Perennial; rhizome creeping, with thick fibrous roots, enveloped together with the base of radical leaves in a hyaline translucent sheath; growth habit changing in the course of development; at flowering scape (17) 20–40 cm long, terete, glabrous in lower part, tomentose at the top; basal leaves 3–6 (7), congested, prostrate, oboval, petiolately narrowed at base, mostly mucronate, (12) 15–25 (27) cm long, 4–8 cm broad, green above, pale beneath, glabrous on both sides, slightly ciliate on the margin; flowering raceme umbellate, 2–4 cm long, loosely 2–12-flowered; flowers upturned, slightly spreading, ebracteolate; pedicels tomentose, as long as or slightly longer than flowers; perianth yellowish-white; perianth segments narrowly oblong, narrowed toward base, round-tipped to acutish, 0.7–1.0 cm long, 5-nerved, equal; stamens equal, shorter than perianth; filaments dilated at base; anthers ellipsoid, erect, 2-loculed, 2-rimose, opening

* Named after DeWitt Clinton, Governor of New York at the beginning of the 19th century.

** Arranged by O.I. Kuzeneva.

Plate XXVII

1. Clintonia udensis Fisch. et Mey.; 1a) flowering cluster; 1b) flower.– 2. Smilacina trifolia Desf. 2a) flower.– 3. Streptoptus ajanensis Tifl.; 3a) flower.– 4. Majanthemum bifolium F. Schmidt; 4a) flower.– 5. Streptoptus amplexifolius DC.; 5a) flower; 5b) same without perianth.

lengthwise; ovary 3-celled, ellipsoid, smooth, green; stigma 3-lobed, the short lobes recurved; in fruiting leaves 20–33 cm long and 4–10 cm
451 broad, more appressed to the ground; scape elongating to (35) 45–80 (87) cm long; inflorescence elongating to 5–28 (40) cm; pedicels widely scattered except at the top where gathered in an umbel of 3–6, arcuately upcurved, 2–6 cm long; fruit at first apparently baccate, dark blue, ca. 1 cm long, at length drying into a dehiscent capsule with 3 imperfect cells. May-June. (Plate XXVII, Figure 1 a, b).

Mountain areas, primeval forests, especially among conifers with moss undergrowth, rarely in mixed forests. — Far East: Okh., Ze.-Bu., Uda, Uss., Sakh. **Gen. distr.**: Jap.-Ch. Described from the Uda estuary. Type in Leningrad.

Genus 288. **SMILACINA*** DESF.**

Desf. in Annales du Mus. IX (1807) 52.

Perianth petaloid, 6-parted down to base, stellate, deciduous; stamens 5, inserted at the base of perianth segments; anthers ovoid, introrse; pistil 1, with a 2- or 3-celled ovary, a short style and an obtuse 2- or 3-lobed stigma; fruit a spherical berry. Caulescent plants with sessile or amplexicaul leaves and a terminal inflorescence.

1. Stem up to 20 cm long; leaves 2 or 3 . . . . . 3. **S. trifoliata** Desf.
+ Stem more than 20 cm long; leaves 4–11 . . . . . 2.
2. Flowering raceme simple . . . . . 1. **S. dahurica** Turcz.
+ Flowering raceme branched . . . . . 2. **S. hirta** Maxim.

1. **S. dahurica** Turcz. Cat. Baic.-Dah. (1837) No. 1129 nom. nud.; Ldb. Fl. Ross. IV (1853) 128; Turcz. Fl. baic.-dah. II (1856) 206. — Ic.: Miyabe et Miyake, Fl. Saghalin (1915) t. 12. — HFR No. 443.

Perennial; rhizome slender, creeping, 2–3 mm long [?]; stem erect, slightly arched at the top, ribbed, covered with scattered hairs, (25) 35–60 cm long, clothed in lower part with 1–3 membranous sheaths; leaves 7–11, alternate, sessile, semiamplexicaul, oblong to oblong-elliptic, terminating in a sharp or obtusish point, green and glabrous above, glaucescent beneath, sparsely hairy on the lower surface and on the margin, (5) 6–10 (12) cm long, 2–3 (4) cm broad; raceme simple, rather dense, 2–5 cm long; pedicels pubescent, in clusters of (2) 3 or 4 (5), 0.3–0.7 cm long, the subtending scalelike bracteolate 0.1–0.3 cm long; perianth wide
452 open, white, 0.5–0.8 cm across; segments elongate, narrowed at both ends, 0.5 cm long, 0.1 cm broad; stamens about the length of perianth; pistil including style shorter than perianth; berry spherical, in maturity black tinged with red, 0.5–0.8 cm long. June-July.

Woods (mostly broad-leaved) and wood margins, river valleys, rarely slopes. — E. Siberia: Lena-Kol. (basin of upper Aldan), Dau.; Far East: Okh., Ze.-Bu., Uda, Uss., Sakh. **Gen. distr.**: China. Described from Dauria. Type in Leningrad.

* Derived from the generic name Smilax and implying systematic affinity between the two genera.

** Arranged by O.I. Kuzeneva.

2. S. **hirta** Maxim. Prim. Fl. Amur. (1859) 276. — S. japonica var. mandshurica Maxim. m Mélang. Biol. XI (1883) 857; Kom., Fl. Manchzh. I (1901) 471; Kom. and Alis., Opred. rast. Dal'nevost. kr. I (1931) 377.

Perennial; rhizome horizontal, creeping, 0.5–0.8 cm in diameter, fleshy, whitish, stem (20) 30–50 (70) cm long, coated at base with 1–3 scalelike sheaths, 0.3–0.5 cm in diameter, erect, slightly flexuous at the end, glabrous or sparingly hairy in lower part, hispid or rarely glabrous in upper part; leaves (4) 5–7, borne on the upper part of the stem, alternate, petiolately narrowed at base, semiamplexicaul, broadly elliptic to elongate-elliptic, pubescent at the margin, ciliate, glabrate elsewhere, 5–12 (14) cm long, (2) 4–7 (9) cm broad, the upper smaller than the lower; flowers numerous in a compound branched raceme (2) 4–7 cm long; pedicels puberulous, subtended by a hyaline bracteole; perianth wide open, white, ca. 0.8–0.9 cm in diameter; segments oblong, round-tipped; anthers yellowish, about as long as perianth segments; pistil including style shorter than perianth; berry reddish-black, 0.4 cm in diameter. May-June.

Deciduous woods, wood margins, and shrub thickets. — Far East: Uss. **Gen. distr.**: China. Described from Ussuri area. Type in Leningrad.

3. S. **trifoliata** Desf. in Ann. du Mus. Paris IX (1807) 52; Ldb. Fl. Ross. IV, 128.

Perennial; rhizome slender, creeping, 0.2–0.3 cm in diameter; stem erect or slightly curved, simple, glabrous, 8–20 cm long, clothed in lower part with 1–3 membranous scales; leaves 2 or 3, alternate, semiamplexicaul, oblong-elliptic, acuminate or somewhat rounded in upper part, terminating in a small point, green, glabrous, sometimes with short hairs on the margin and the upper part, (4) 6–10 (12) cm long, (1) 2–3 cm broad; flowers 4–10, small, in a loose terminal raceme (2) 4–6 (8) cm long; pedicels subtended by a hyaline bracteole, the upper 0.2–0.5 cm long, the lower 0.5–2.0 cm long; perianth wide open, white, 0.5–0.8 cm in diameter, with elliptic segments; stamens with violet anthers, about equaling the
453 perianth; pistil shorter than perianth; berry spherical, dark red, 0.5–0.7 cm in diameter. May-June, beginning of July. (Plate XXVII, Figure 2, a).

Mossy shallow bogs, also very wet places in swampy forests. — W. Siberia: Ob. (sporadically in the SW part of the Yenisei River basin); E. Siberia: throughout; Far East: throughout except Kamchatka. **Gen. distr.**: Jap.-Ch., N. Am. Described from Siberia. Type in Florence.

Note. Material from E. Siberia is largely characterized by a more elongated inflorescence and longer lower pedicels (up to 2 cm) as compared with material from the Far East.

Genus 289. **MAJANTHEMUM** WIGG.*

Wigg. Prim. Fl. Holsat., (1780) 14; Bifolium Gaertn. Fl. Wetter. I (1799) 209.

Perennials with creeping rhizome; stems erect, with 2 or rarely 3 leaves near the top; leaves alternate, cordate-lanceolate; inflorescence a terminal raceme; flowers small; pedicels slender, 2-jointed; perianth with

* Arranged by B.A. Fedchenko.

4 spreading segments; stamens 4, shorter than perianth segments; anthers ovoid, dorsifixed; ovary subsessile, short, 2-celled; the cells 2-ovuled; style filiform.

1. Plants to 40 cm tall; leaves to 10 cm broad, somewhat fleshy; flowers to 7 mm in diameter; perianth segments broadly rounded . . . . . 2. M. dilatatum (Wood.) Nels. et Macb.
2. Plants to 25 cm tall; leaves to 6 cm broad, more pointed; flowers ca. 5 mm in diameter; perianth segments oblong . . . . . 1. M. bifolium (L.) F. Schmidt.

1. M. **bifolium** (L.) F. Schmidt, Fl. Boehm. Cent. IV (1824) 55.— Smilacina bifolia Schult. Syst. veg. ed. 7, I (1829) 307.— Convallaria bifolia L. Sp. pl. (1753) 316.— Ic.: Rchb. Ic. Fl. germ. X, tab. 336.— Exs.: Hayek Fl. stir. No. 17; Fries Herb. norm. fasc. XVI.

Perennial; 12–25 cm tall; rhizome slender, creeping, often producing underground offshoots; stem erect, bearing in upper part 2 (rarely 3) leaves; leaves close to base of peduncle, short-petioled; leaf blade deeply cordate-ovate, to 10 cm long, with a rather broad sinus at base, narrowed toward apex, acute, the lower surface usually with short hairs on the veins; flowers in a terminal raceme; bracts small, scarious; perianth segments white, oblong, not more than 3 mm long; style linear, as long as ovary; berry at first gray with reddish spots, becoming cherry-red. May-July. (Plate XXVII, Figure 4a).

Woods, mostly coniferous or mixed.— European part: all regions, except L. V.; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: all regions;
454 Far East: Kamch., Okh., Ze.-Bu., Uda. **Gen. distr.**: Centr. Eur., Scand., Med., Bal.-As. Min., Mong., Jap.-Ch. Described from N. Europe. Type in London.

2. **M. dilatatum** (Wood.) Nels. et Macb. in Bot. Gaz. LXI (1916) 30.— M. bifolium dilatatum Wood. in Proc. Acad. Sc. Philadelph. (1868) 174.— Convallaria bifolia var. kamtschatica Chamiso in Linnaea VI (1831) 587.— Smillacina bifolia var. kamtschatica Ldb. Fl. Ross. IV, 127.— M. kamtschaticum Kom., Puteshestv. v Kamchatku (1909) 453; Fl. Kamch. I, 302.— Unifolium dilatatum Howell. Fl. N. W. Amer. I (1902) 657.— M. canadense Kom. Fl. Mansh. I, 474 (non Desf.).— Ic.: Le Roy Abrams. Fl. Pacif. states, Figure 1.

Perennial, 15–25 cm tall, rarely up to 40 cm (var. vegetior Kom.); rhizome nodose, stouter than in the preceding species, sometimes branched; stem erect, with 2 leaves in upper part (rarely 3 — var. trifolia Kom.); leaves rather thick, somewhat fleshy, lustrous green, the sinus broader and the basal lobes more spreading than in the preceding species; inflorescence denser than in the preceding species, containing up to 25 flowers; flowers somewhat larger, almost completely inodorous; perianth segments broader, slightly fleshy, sometimes up to 4 mm long (var. vegetior Kom.); May-June.

Birch woods, slopes, clearings, meadows, and coastal dunes.— Far East: Kamch., Uss., Uda, Sakh. **Gen. distr.**: Jap.-Ch., N. Am., Sitka Is. [Baranof Island], Alaska, Oregon, Washington, Idaho, California. Described from Oregon (from Astoria to Dallas). Type in Washington.

Genus 290. **DISPORUM** SALISB.*

Salisb. in Trans. Hort. Soc. I (1812) 331 (nomen solum); Don. Prodr. Fl. Nepl. 50.

Rhizome creeping, horizontal; stems little branched, leafy; leaves alternate, sessile or short-petioled, ovate to lanceolate, membranous, with a dense network of veins; flowers solitary or in pairs, at the ends of branches, rarely numerous in an umbellate inflorescence; pedicels spreading to pendent; perianth deciduous, narrowly campanulate; segments distinct, erect or reflexed at tips; stamens inserted at base of and not exceeding the perianth segments; filaments linear or dilated; ovary sessile or tapering at base, 3-celled, the cells 2- or rarely 4–6-ovuled; style filiform, 3-fid; fruit subspherical, baccate; seeds ovoid-globose.

1. D. viridescens (Maxim.) B. Fedtsch. comb. nova — D. smilacinum Asa Gray; Plant. japon. in Parry's exped. p. 321. — D. var.
455 viridescens Maxim., Mél. biol. XI, 858. — Uvularia viridescens Maxim. Prim. Fl. Amur (1859) 273. — Prosarthes viridescens Rgl. Pl. Ussur. No. 493.

Perennial, 40–70 cm tall, glabrous; root fibrous; floriferous stem accompanied by another stem due to flower the following year and bifurcate below summit; cauline leaves alternate, the lowest subvaginate, the others borne on very short petioles, oblong-ovate, 5–7-nerved; inflorescence umbellate, commonly of 2 flowers in the axil of a leaf on one of the branches; pedicels slender; filiform, pendent; perianth segments oblong-lanceolate, acuminate, glabrous, cupuliformly spreading, whitish-green; stamens less than half the length of perianth; filaments subulate; ovary subspherical, the cells 2-ovuled; style about the length of ovary; stigmas 3, recurved, fruit a juicy berry. June.

Banks of rivers and streams, among plants in shaded soil, and in the shade of trees of bottomlands. — Far East: Uss. Gen. distr.: Jap.-Ch., N. China, Manchuria. Described from the Amur River between the estuaries of the Khungari and Dondon rivers. Type in Leningrad.

Genus 291. **STREPTOPUS**** L. C. Rich. †

L.C.Rich. in Michx., Fl. bot. amer. I (1803) 200.

Herbaceous perennials with leafy stem; flowers solitary or paired in the axils of stem leaves; pedicels appressed to the superposed node and thus the flower appearing sessile under the next cauline leaf; perianth campanulate, the segments slightly united at base; stamens inserted at the base of perianth segments; style 3-fid; ovary sessile, 3-celled, the cells many-ovuled; fruit a many-seeded berry; seeds oblong.

1. Stem branched, long; leaves amplexicaul, oval to oval-oblong; flowers solitary, axillary, small, the segments of the rosy perianth reflexed at tips; berry oblong, red . . . . . 1. **S. amplexifolius** DC.
+ Stem to 40 cm long, simple or with very few axillary branches; flowers dark red; berry subspherical . . . . . 2. **S. streptopoides** (Ldb.) Nelson et Macbr.

* Arranged by B.A. Fedchenko.

** From Greek streptos, twisted, and pus, leg, referring to the apparently twisted pedicel.

† Arranged by B.A. Fedchenko.

1. S. amplexifolius (L.) DC. in Lam. et DC. Fl. Franc. III (1805) 174; Ldb. Fl. Ross. IV, 122. — Uvularia amplexifolia L. Sp. pl. (1753) 304. — Ic.: Mich. Fl. bor. amer. I, tab. 18; Redouté, Liliac. tab. 259; Rchb. Ic. Fl. Germ. X, tab. 421; f. 959.

456 Perennial, 40–100 cm long; rhizome short, giving rise to thick roots; stem branched only in upper part; leaves oval to oblong-ovate, deeply cordate at base, amplexicaul, thin, acute, glabrous, grayish-green beneath, with irregularly scattered veins; peduncles to 5 cm long, simple or branched, strongly recurved in upper part; perianth segments rosy, oblong, somewhat convolute in upper part; style shortly 3-fid; filaments very short; fruit a red berry. July-August. (Plate XXVII, Figure 5 a, b).

Wet mossy woods and coppices. — E. Siberia: Lena-Kol; Far East: Uda, Kamch., Uss. Gen. distr.: Centr. Eur., Med., Jap.-Ch., N. Am. Described from Czechoslovakia. Type in London.

2. S. streptopoides (Ldb.) Nelson et Macbr., Bot. Gaz. vol. LXI (1916) 30. — S. ajanensis Tilling. in mss. — Kruhsea Tillingiana Rgl. in Rgl. et Till. Fl. ajanens. (1858) No. 281. — K. streptopoides (Ldb.) Kearney in Herron. Explor. Alaska, Adj. Gen. Off. 31 (1901) 74, ex Le Roy Abrams, Fl. pacif. States I, 458. — Smilacina streptopoides Ldb. Fl. Ross. IV (1854) 128, quoad plantam ajanensem. — Ic.: Le Roy Abrams (1916) 30 Fl. pacif. States, Vol. I, 458.

Perennial, 10–20 cm tall; rhizome producing a single stem each year; stem with 2 coriaceous sheaths at base, erect, glabrous, terete, simple or with 1 or 2 axillary branches in upper part; leaves alternate, subamplexicaul, elliptic to elliptic-lanceolate, acuminate, 6–9-nerved, to 50 cm long, glabrous, entire or the margin with small elongate linear teeth; peduncles monanthous, recurved, situated close to leaf margin, filiform, jointless, one-fourth to one-third the length of leaf; berry red; seeds striate, yellowish. 15–30 mm [?].

Wet places. — E. Siberia: Lena-Kol. (Yablonovyi Range); Far East: Okh., Ayan, Ze.-Bu. Gen. distr.: Jap.-Ch. (N. Korea, Nippon); N. Am. (from Alaska to Washington State; reports for Sitka refer to Streptopus roseus Michx.). Described from Ayan. Type in Leningrad.

Genus 292. **POLYGONATUM** * (TOURN.) ADANS.**

Adans., Fam. II (1763) 53.

Flowers bisexual, axillary; perianth tubular, gamophyllous, greenish-white, sometimes rosy, with 6 short teeth; stamens 6, inserted and
457 included in perianth tube; pistil with a long filiform style and a 3-lobed stigma; ovary 3-celled; fruit a 1–9-seeded berry, the cells 1-seeded [?]; flowers 1–4 in the leaf axils, with pendent pedicels; rhizome stout, horizontal, thickened at the site of rounded scarlike depressions left by dead old aerial stems.

1. Leaves verticillate . . . . . 2.
+ Leaves alternate . . . . . 6.

* From Greek polis, many and gonum, angle, edge.

** Arranged by O.E.Knorring.

2. Flowers rose; bracts minute . . . . . 1. **P. roseum** (Ldb.) Kunth.
+ Flowers white; bracts more developed. . . . . 3.
3. Filaments pubescent or glandular . . . . . 4.
+ Filaments and leaves glabrous . . . . . 5.
4. Filaments pubescent; leaves covered with short hairs . . . . . 3. **P. verticillatum** (L.) All.
+ Filaments glandular-margined; leaves glabrous, recurved at apex. . . . . 5. **P. Sewerzowi** Rgl.
5. Bracts minute; peduncles much longer than bracts . . . . . 4. **P. sibiricum** Redouté.
+ Bracts larger, about twice the length of peduncle . . . . . 2. **P. stenophyllum** Maxim.
6. Flowers narrowed above the ovary, with perianth distinctly constricted . . . . . 7.
+ Flowers not constricted . . . . . 9.
7. Leaves broadly oval, subsessile, hairy beneath; flowers small . . . . . 15. **P. obtusifolium** Miscz.
+ Leaves elliptic or lanceolate . . . . . 8.
8. Leaves oblong-lanceolate, covered beneath with short hairs; filaments slightly pubescent . . . . . 16. **P. polyanthemum** (M. B.) Dietr.
+ Flowers smaller; leaves glabrous, cinerescent beneath; filaments pubescent . . . . . 17. **P. multiflorum** (L.) All.
9. Bracts large, foliaceous . . . . . 10.
+ Bracts hyaline or absent . . . . . 11.
10. Leaves broadly oval; peduncles short; flowers 2, large, inclosed in broad green ovate-lanceolate bracts . . . . 6. **P. involucratum** Maxim.
+ Leaves narrower; flowers paired, each inclosed in a broad bract. . . . . 7. **P. Desoulavii** Kom.
11. Stems covered in upper part with short hairs; peduncles pubescent. . . . . 11. **P. latifolium** Desf.
458 + Stems glabrous . . . . . 12.
12. Peduncles bearing 1 flower each, glabrous, short; leaves oblong-lanceolate, lustrous above; low plants . . . . . 8. **P. humile** Fisch.
+ Peduncles bearing 2 or rarely 1 flower, longer; taller plants . . . . . 13.
13. Leaves oval-lanceolate, gradually tapering to a point; flowers few . . 14.
+ Leaves oblong-elliptic, oval or broadly oval, subobtuse; flowers on the middle part of stem more numerous . . . . . 15.
14. Filaments pubescent in upper part; perianth narrowed toward summit . . . . . 12. **P. acuminatifolium** Kom.
+ Filaments glabrous; perianth regularly enlarged toward summit. . . . . 13. **P. glaberrimum** C. Koch.
15. Leaves pubescent on the veins beneath; very broad; filaments more or less scabrous . . . . . 10. **P. Maximowiczii** F. Schmidt.
+ Leaves glabrous on the veins beneath . . . . . 16.
16. Leaves oblong-ovate to lance-elliptic; peduncles not thickened, 1–2-flowered . . . . . 9. **P. officinale** All.
+ Leaves broadly elliptic to broadly oval; peduncles thickened, 2–3-flowered . . . . . 14. **P. ovatum** Miscz.

Series 1. Verticillatae Kom. — Leaves verticillate, narrow.

1. P. roseum (Ldb.) Kunth, Enum. (1850) 144; Ldb. Fl. Ross. IV, 123; Kryl., Fl. Zap. Sib. (1929) 656. — Convallaria rosea Ldb. Fl. Alt. II (1830) 41. — Ic.: Ldb. Ic. Fl. Ross. I (1829) tab. 1; Bot. Mag. XXXIV (1858) tab. 5049.

Perennial, 35–70 cm tall; stem terete, angled; leaves verticillate, alternate [?], oval-lanceolate to linear-lanceolate, acuminate, 7–15 cm long, 1–2 cm broad, green above, cinerescent beneath, glabrous; peduncles glabrous, bifurcate, several in leaf axil, erect in fruit, bearing 2 flowers, the hyaline bract very small; perianth rose, tubular, constricted above the ovary, the elongate teeth slightly pubescent at the tips within; filaments glabrous, adnate to perianth; fruit a brownish-red berry. May-June.

Spruce and broad-leaved forests, mountain scrub, and meadows. — W. Siberia: Irt.; Centr. Asia: Pam.-Al., T. Sh. **Gen. distr.**: Dzu.-Kash. Described from the Irtysh River. Type in Leningrad.

2. P. **stenophyllum** Maxim. Prim. Fl. Amur. (1859) 274; Bullet. de l'Acad. IV (1881) 216; Kom., Fl. Manchzh. I (1901) 481. — P. verticillatum var. stenophyllum Baker in Journ. Linn. Soc. XIV (1870) 561. — Ic.: Kom. and Alis., Opred. rast. Dal'nevost. kr. I (1931), Plate 117.

459 Perennial, 60–75 cm tall; stem angled, smooth; leaves narrow, linear, long-acuminate; 10 cm long, 5 cm broad, in whorls of 4–6, glabrous, green above, cinerescent beneath; peduncles short; glabrous, bifurcate, the subtending hyaline bracts about twice the length of peduncle; flowers small, white, in axillary whorls of 6; filaments glabrous, the upper part adnate to perianth; fruit a black berry. June. (Plate XXVIII, Figure 8, a, b).

Broad-leaved forests, shrub thickets, and meadows. — Far East: Uss., Ze.-Bu. Described from the southern course of the Amur (Bureya Mountains). Type in Leningrad.

3. P. **verticillatum** (L.) All. Fl. Pedem. I (1785) 131; Ldb. Fl. Ross. IV, 123; Boiss. Fl. Or. V, 333; Shmal'g., Fl. II, 481; Kryl., Fl. Alt. VI (1912) 1335. — Convallaria verticillata L. Sp. pl. (1753) 315. — Ic.: Ann. du Mus. Paris. Lil. t. 144.

Perennial, 30–60 cm tall; stem angled, glabrous; lower leaves sessile, alternate, the others in whorls of 4–8, lanceolate to linear-lanceolate, acuminate, 7 to as much as 17 cm long, 1–2.5 cm broad, or else 12–15 cm long and 2–3 cm broad (var. longifolium Miscz.); peduncles glabrous, axillary, with 2 or 3 pendulous flowers; perianth tubular-campanulate, white, the teeth pubescent at the tips within; filaments pubescent; fruit a violet-red berry. June-July.

Shady woods, at 1500–1800 m. — Caucasus: Cisc., W. and E. Transc. **Gen. distr.**: Scand., Centr. Eur., Atl. Eur., E. Med., Bal.-As. Min., Ind.-Him., Jap.-Ch. Described from Europe. Type in London.

4. P. **sibiricum** Redouté, Lil. VI (1912) 314; Ldb. Fl. Ross. V, 124; Turcz. Fl. Baic.-Dahur. II, 203; Maxim, Mélang. Biol. XI (1841) 854; Maxim., Prim. Fl. Amur. 478. — Ic.: Redouté, Lil., VI (1812) t. 315.

Perennial, 40–55 cm tall; stem glabrous, ribbed; leaves linear to linear-lanceolate, 7–8 cm long up to apical curl and 5 mm broad, the tip circinate; upper leaves in whorls of 4–6, the lower alternate, glabrous,

green above, dull cinerescent beneath; peduncles axillary, long, at first erect, becoming cernuous, bifurcate at the end, bearing small hyaline bracts; flowers in 6's or 7's; perianth tubular, white, slightly constricted above ovary, with elongate teeth; filaments glabrous, the upper part adnate to perianth. May. (Plate XXVIII, Figure 5 a).

Woods. — E. Siberia: Dau. Gen. distr.: N. Mongolia, Jap.-Ch. Described from Siberia. Type in Geneva.

460 5. P. **Sewerzowi** Rgl. in Bull. Soc. Nat. Mosc. XII, 2 (1868) 436. — P. aflatunense B. Fedtsch., Rast. Turk. (1915) 255. — P. Haussknechtii Bornm. et Sint. in Mitt. Thür. Bot. Ver. XVIII (1903) 52. — Exs.: Herb. Fl. As. Med. No. 347.

Perennial, 50–70 cm tall; stems angled; lower leaves alternate, sessile, broadly amplexicaul at base, lance-oblong; upper leaves in whorls of 3 or 4, linear-lanceolate, glabrous, 9–13 cm long, 1.5–2.5 cm broad, upcurved, attenuate to a tapering point; peduncles axillary, arched, glabrous, slender, bearing 2 or 3 flowers, the hyaline bract lanceolate; perianth tubular, white, the ovate obtusish teeth slightly pubescent at tips within; filaments glandular-margined, inserted at the middle of perianth; anthers 1–1.5 times the length of filaments. May-June. (Plate XXVIII, Figure 1, a).

Woods and coppices, meadows, among mixed vegetation on mountain slopes. — Centr. Asia: Mtn. Turkm., Amu D., Syr D., T. Sh. Described from Bugun (Kazakhstan). Type in Leningrad.

Series 2. **Bracteatae** Kom. — Bracts large, at first completely covering the flowers; rhizome regular, subcylindric.

6. P. **involucratum** Maxim. in Mélang. Biol. XI (1883) 844; Bull. Acad. Pétersb. XIX (1883) 205. — Periballanthus involucratus Franch. et Sav. Enum. Plant. (1879) 524. — Ic.: Pl. Nippon. VI (1910) tab. 31; Kom. and Alis., Opred. rast. Dal'nevost. kr. I (1931) Plate 116.

Perennial, 23–35 cm tall; stem between the leaves sulcate, elsewhere terete, glabrous; leaves broadly oval, pointed at both ends, glabrous, 6–10 cm long and 3.5–5 cm broad, short-petioled, green above, cinerescent beneath, all leaves borne on upper part of the stem; peduncles short, bearing 2 large flowers enclosed in broad ovate-lanceolate green bracts; perianth white, the triangular teeth slightly pubescent at the tips within; filaments glabrous, inserted on upper third of perianth. May-June. (Plate XXVIII, Figure 7, a).

Mixed and relatively shady woods. — Far East: Uss. Gen. distr.: Jap.-Ch. Described from Japan. Type in Japan.

463 7. P. **Deoulavyi** Kom. Bull. Inst. Bot. Ac. URSS XXX (1932) 199. — Ic.: Kom. and Al., Opred. rast. Dal'nevost. kr. I (1931), Plate 117.

Perennial; rhizome horizontally creeping, white; stems erect, pliable; leaves elliptic to ovate-elliptic, obtuse-tipped, prominently 3–5-nerved; flowers in pairs, covered by bracts; perianth white, tubular, subcylindric or slightly inflated above the middle, the deltoid teeth greenish; filaments dilated, smooth.

Plate XXVIII

1. Polygonatum officinale All.: 1a) flower in section.— 2. P. Sewerzowii Rgl.: 2a) flower in section.— 3. P. latifolium Desf.: 3a) flower in section.— 4. P. multiflorum (L.) All., 4a) flower in section.— 5. P. sibiricum Redouté; 5a) flower in section.— 6. P. humile Fisch.: 6a) flower in section.— 7. P. involucratum Maxim.: 7a) flower in section.— 8. P. stenophyllum Maxim.: 8a) flower in section; 8b) fruits.

Far East: Uss. Endemic. Described from Russkii Ostrov. Type in Khabarovsk.

Series 3. **Angulatae** Kom. — Leaves alternate; peduncles ebracteolate; stems angled; rhizome thickened at the base of stems, monoliform.

8. P. **humile** Fisch. ex Maxim. Prim. Fl. Amur. (1859) 275; Kom., Fl. Man'chzh. I (1902) 477; Kryl., Fl. Zap. Sib. III, 655. — P. officinale var. humile Bak. in Journ. Linn. Soc. XIV (1875) 554. — Ic.: Makino Icon. Pl. Nippon. VI (1910) tab. 7.

Perennial, 14–30 cm tall; stem ribbed, glabrate; leaves alternate, sessile, oblong-lanceolate, acuminate, semiamplexicaul, green on both sides, lustrous and smooth above, hairy on the veins beneath, 3–8 cm long, 1.5–3.5 cm broad; peduncles in the axils of middle leaves, glabrous, arched, each bearing a solitary flower; perianth white, with green teeth, 15–18 mm long and ca. 4.5 mm broad; filaments papillose, inserted above the middle of perianth; fruit a glaucescent-black berry. May-June. (Plate XXVIII, Figure 6, a).

Broad-leaved and pine woods, shrub thickets, and rarely steppe meadows or meadow slopes. — W. Siberia: Ob, Irt.; E. Siberia: Ang.-Say., Dau.; Far East: Uss. **Gen. distr.**: Jap.-Ch. Described from Dauria (Nerchinsk). Type in Leningrad.

9. P. **officinale** All. Fl. Pedem. I (1785) 131; Turcz. Fl. Baic.-Dahur. II (1852) 203; Maxim. Prim. Fl. Amur. (1841) 277; Ldb. Fl. Ross. IV, 123; Shmal'g., Fl. II, 480; Kom., Fl. Man'chzh. I (1901) 479; Kryl., Fl. Zap. Sib. III, 655. — Convallaria polygonatum L. Sp. pl. (1753) 315; Ldb. Fl. Alt. II (1830) 41. — Polygonatum vulgare Desf. Fl. or. (1867) 382. — Ic.: Syreishch., Fl. Mosk. gub. I (1906) 243; Benth. Handb. Brit. Fl. (1865) Figure 1018. — Exs.: Pl. Finl. exs. No. 163; HFR No. 293.

Perennial, 30–65 cm tall; stem angled, glabrous; leaves alternate, amplexicaul, oblong-elliptic, rarely ovate, 10–12 cm long, 4.5–5 cm broad — v. robustum Korsh. of 12–14 cm long and 2–3 cm broad —
464 var. angustifolium Miscz., green above, cinerescent and dull beneath; pedicels 1 or 2 in the leaf axils, nodding; perianth tubular, white, the 6 ovate greenish teeth pubescent at the tips within; filaments inserted at the middle of perianth tube, glabrous; anthers linear, the length of filaments; fruit a bluish-black berry. May. (Plate XXVIII, Figure 1, a).

Coniferous or birch woods and coppices. — European part: Lad.-Ilm., U. V., V. Kam., U. Dnp., V.-Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag.; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., Dau.; Far East: Ze.-Bu. **Gen. distr.**: Scand., Centr. Eur., Atl. Eur., W. Med., Mong., China. Described from Europe. Type in London.

10. P. **Maximowiczii** F. Schmidt. Fl. Sachal. in Mém. Acad. Petr. Sér. VII, XII, No. 2 (1868) No. 449; Trudy Sibir. eksped. (1874) 202, No. 465. — P. officinale var. Maximowiczii Maxim. in Mél. Biol. (1883) 847. — Japanese: "o-amadokoro", Gilyak: "vet-puks."

Perennial; stems angled, to 1 m long, arched-recurved; leaves ranged in one plane, large, 20 cm long, 8 cm broad, oboval-elliptic, acute, very short-petioled, prominently 7–9-nerved, pruinose beneath, smooth and dull above; peduncles axillary, closely spaced, reclinate, 2- or 3-flowered, forked at the middle, ca. 3 cm long; flowers narrowed toward base, subinfundibular, prominently 6-nerved outside, to 4 cm long, white, with green-tipped teeth; stamens adnate to perianth for two-thirds its length, strongly arched; berry spherical, black, ca. 12 mm across; seeds globose, ca. 3 mm long, smooth, dark-colored. June-July.

Shrub thickets, wood margins, mountain meadow slopes, often solitary or in small groups. — Far East: Sakh., Uss. Gen. distr.: Jap.-Ch. Described from vicinity of Due on Sakhalin Island. Type in Leningrad.

Note. The characteristic features of this plant are well expressed in Sakhalin specimens. They are less distinct on the mainland and in westerly direction they gradually acquire the characteristics of typical P. officinale All.

11. **P. latifolium** Desf. in Ann. Mus. Paris IX (1807) 50; Ldb. Fl. Ross. IV, 123; Boiss. Fl. Or. V (1867) 332; Shmal'g., Fl. II, 480; Vul'f., Fl. Kryma I (1930) 70. — Convallaria latifolia Jacq. ex M. B. Fl. taur.-cauc. I (1808) 282. — Ic.: Hegi Ill. Fl. Mittel. Eur. II (1909) 272; Redouté Liliac. V (1809) 243.

Perennial, 30–50 cm tall, stem angled, the upper part rather densely covered with setiform hairs; leaves ovate-oblong, acuminate, puberulous beneath, 9–12 cm long, 4–6 cm broad, tapering at base into a short petiole;
465 peduncles axillary, 1–4-flowered, nodding, puberulous; bracts minute; hyaline; perianth tubular, without constriction, the 6 tips pubescent at the tips; filaments glabrous, inserted at the middle of perianth; fruit a bluish-black berry. April-May. (Plate XXVIII, Figure 3, a).

Woods and coppices. — European part: V.-Ka., U. Dnp., V.-Don, Transv., Bl., Crim., L. Don. Gen. distr.: Centr. Eur., Bal.-As. Min. (E.), Dzu.-Kash. Described from France. Type in Paris.

12. **P. acuminatifolium** Kom. in Bull. Jard. Bot. Princ. XVII (1916) 157. — Ic.: Kom. and Alis., Opred. rast. Dal'nevost. kr. I (1930) 378, tab. 116, Figures 3 and 6 (fl.).

Perennial, 20–35 cm tall; stem erect, angled, glabrous; leaves oval-lanceolate, acuminate, short-petioled, 5–7 at the end of stem, glabrous; pedicels bearing 2 large flowers, nodding, glabrous; perianth tubular, the deltoid teeth slightly pubescent at the tips within; filaments pubescent in upper part, the upper part adnate to perianth. April.

Shaded places in mixed woods. — Far East: Uss. Endemic. Described from the Suputinka River. Type in Leningrad.

13. **P. glaberrimum** C. Koch. in Linnaea XXII (1849) 267; Grossg., Fl. Kavk. I, 240.

Perennial; rhizome thickened, moniliform; stem angled, furrowed, falcately curved at the end, 40–60 cm long; leaves short-petioled, oval-lanceolate, gradually tapering to a point, acute, glaucous beneath, ca. 8 cm long, 3–4 cm broad, with 3–6 translucent veins beside the midrib; peduncles few, axillary, bearing 1 or 2 flowers; flowers white, ca. 2.5 cm long, quite

smooth; stamens in lower part fused with perianth, distinct above the middle of perianth tube; fruit subspherical, black. May, June.

Middle mountain zone, in woods. — Caucasus: E. Transc. Endemic. Described from Elizavetpol' [Kirovabad]. Type in Berlin.

Note. Not being in possession of authentic specimens, the author treats this characteristic species as marked by A.A. Grossgeim in the herbarium. If Grossgeim's determinations do not refer to Koch's plants, then this is a well defined new species.

14. P. ovatum Miscz. in shedis; Grossh., Fl. Cauc. I (1928) 241.

Perennial; rhizome thickened, more or less monoliform; stem angled, furrowed, densely leafy, 0.5–1 m long; leaves broadly elliptic or broadly
466 oval, to 12 cm long and 6 cm broad, round-tipped and minutely mucronulate, glaucous beneath, with 9 translucent veins on either side of the midrib; peduncles numerous, axillary, flattened, bearing 2 or 3 pedicels, distinctly thickened as compared with those of other species; flowers 2.25 cm long, white, enlarged upward, the margins of teeth quite smooth; stamens fused with perianth up to the middle, distinct above, smooth, reaching two-thirds the length of tube; berry spherical, black. April, May.

Mountain woods. — Caucasus: Cisc., W. Transc. Endemic. Described from the vicinity of Mineral'nye Vody. Type in Leningrad.

Series 4. Parviflorae Kom. — Stem as in the preceding species, but flower more numerous, small.

15. P. obtusifolium Miscz. (ined.); Grossg., Fl. Kavk. I (1928) 241.

Perennial, 20–30 cm tall; stem furrowed, glabrous; leaves crowded on upper part of stem, alternate, broadly oval, obtuse, triangular, short-petioled to subsessile, 5–6 cm long, 3–3.5 cm broad, the veins on lower surface hairy; pedicels short, pendent, bifurcate at the ends, glabrous, bearing 2 or 3 flowers; perianth 6–7 mm long, white, strongly constricted above the base; filaments attached to perianth at the middle. May.

Woods. — Caucasus: W. Transc. Endemic. Described from Abkhazia. Type in Leningrad.

16. P. polyanthemum (M.B.) Dietr. in Otto Gartenz. (1835) 223; Ldb. Fl. Ross. IV, 125; Boiss. Fl. Or. V (1867) 332; Shmal'g., Fl. II, 480. — Convallaria polyanthema M.B. Fl. taur.-cauc. III (1819) 272. — Exs.: HFR No. 690.

Perennial, 20–30 cm tall; stem angled, glabrous; leaves oblong-lanceolate, narrowed toward base, 11–8.5 [?] cm long, 3.5–4.5 cm broad, sometimes numerous and dense (v. talyschense Miscz.), the nerves on the lower surface covered with short hairs; flowers in 2's to 4's, rarely more numerous (var. talyschense Miscz.), small, borne on slender glabrous pedicels; perianth white, constricted above the base, then again enlarged; filaments slightly pubescent, attached to perianth above the middle. April-May.

Spruce-and-fir and broad-leaved woods, and coppices. — European part: Crim.; Caucasus: Cisc., Dag., W. Transc. Gen. distr.: Bal.-As. Min., Arm.-Kurd. Described from the Caucasus. Type in Leningrad.

Series 5. **Teretes** Kom. — Stem terete; perianth constricted above base and then again enlarged upward.

17. **P. multiflorum** (L.) All. Fl. Pedem. I (1785) 131; Ldb. Fl. Ross. IV, 125; Boiss. Fl. Or. V (1877) 332; Shmal'g., Fl. II, 481; Kryl., Fl.
467 Zap. Sib. III, 655. — Convallaria multiflora L. Sp. pl. I (1753) 315. — Ic.: Redouté Liliac. IV (1808) tab. 229; Syreishch., Fl. Mosk. gub. (1906) 244. — Exs.: Pl. Finl. exs. No. 164.

Perennial, 30–60 cm tall; stem terete, glabrous; leaves oblong or elliptic, slightly narrowed at base, glabrous, short-petioled, green above, cinerescent beneath, 10–11 cm long, 4–4.5 cm broad or the lower leaves 14–15 cm long (v. macrophyllum Albov.); peduncles glabrous, 3–5-flowered; perianth constricted above ovary, slightly enlarged upward, the 6 greenish teeth puberulous at the tips within; filaments hairy; fruit a bluish-black berry. May-June. (Plate XXVIII, Figure 4, a).

Mixed coniferous and birch woods, and coppices. — European part: Lad.-Ilm., U. V., V.-Ka., Dnp., V.-Don, Transv., Bl., L. Don, Crim., L. V.; Caucasus: Cisc. **Gen. distr.**: Scand., Centr. Eur., Atl. Eur., W. Med., Bal.-As. Min., Arm.-Kurd., Ind.-Him., Jap.-Ch., N. Am. Described from Europe. Type in London.

Note. As far as can be deduced from a single specimen, P. pseudopolyanthemum Miscz. (in Herb. nostro), described by A. A. Grossgeim (Fl. Kavkaza I (1928) 241), does not appear to differ in any way from the widely distributed P. multiflorum (L.) All. It is reported for Dagestan.

Genus 293. **CONVALLARIA*** L.**

L. Syst. ed. I (1737) 96.

Perennial, 15–30 cm tall, with a creeping underground rhizome and numerous small branched roots; scales at the base of aerial shoots white or rose-tinged; cauline leaves 2 or 3, lanceolate to obovate, long-sheathing; perianth spherical-campanulate, with 6 reflexed teeth; stamens 6, the short stout filaments inserted at the base of perianth; style 1, short, stout, with a small stigma; berry 1- or 3-seeded; flowers white, borne on pendent pedicels in a long loose leafless raceme, the pedicels subtended by short hyaline bracts.

1. **C. majalis** L. Sp. Pl. ed. I (1753) 314; Ldb. Fl. Ross. IV, 126; Boiss. Fl. Or. V (1884) 331; Shmal'g., Fl. II, 481. — Convallaria transcaucasica Utkin, Journ. Bot. Russ. XIV (1929) 187. — Ic.: Rchb. Ic. Fl. Germ. (1808) tab. 950; Syreishch., Fl. Mosk. gub. I (1906) 244; Fl. Yugo-Vost. III (1929) 404, tab. 198. — Exs.: Pl. Finl. exs. No. 576.
468 Perennial, 15–30 cm tall; leaves 2 or 3, large, oblong-elliptic, acuminate, long-petioled, 10–20 cm long, 4–8 cm broad; raceme loosely 6–20-flowered; pedicels long, pendulous, the subtending bracts hyaline, shorter than the pedicels, in var. transcaucasica the bracts one-third to one-half the length of pedicels; perianth white, spherical-campanulate

* From Latin words lilium, lily and convalis, valley, i.e., lily of the valleys.

** Arranged by O.E. Knorring.

or campanulate (in var. transcaucasica (Utkin) Knorr.), or broadly campanulate (var. manschurica Kom.), suffused with purplish-violet at base; stamens 6, inserted at the base of perianth; filaments short and stout, mostly shorter than anthers (in v. transcaucasica filaments regular or sometimes narrowed at summit, as long as or shorter than the anthers); style short, with triangular stigma; fruit a red berry. Fl. April-June. (Plate XXIX, Figure 2, a).

Commonly in woods, coppices and wood margins, on mossy soil, rarely in water meadows. — European part: Lad.-Ilm., U.V., V.-Ka., U. Dnp., M. Dnp., V.-Don, Transv., L.V. (Sarepta), L. Don (only in N. part as far as the latitude of the Don), Bl. (Kherson), Crim.; Caucasus: Cisc., Dag., W. and S. Transc.; E. Siberia: Dau.; Far East: Okh., Ze.-Bu., Uda, Uss., Sakh. **Gen. distr.**: Scand., Centr. Eur., Atl. Eur., W. Med., Asia Minor, China, N. America. Described from Europe. Type in London.

Note. L.A. Utkin distinguished in the Caucasus the species C. transcaucasica Utk. It is, however, evident from the material examined that some of the characteristics, such as the regular filaments, are not constant, as specimens occur with more thickened cuneate-based filaments. Similarly shaped filaments are to be found in specimens from the Far East designated by V.L. Komarov as C. manshurica Kom. A distinguishing and fairly constant feature of both Caucasian and Manchurian specimens appears to be the broadly campanulate open corolla. In addition, the Manchurian variety is characterized by strong growth and large leaves. Finally, a Japanese species was established for Sakhalin, C. Keiskei Miq., Prol Fl. Jap. (1867) 312. Thus the Linnaean species C. majalis breaks up into four geographically distinct but morphologically little diversified recent species, not to mention the species from the Alleghany Mountains of North America, for which no separate name has so far been proposed but which are also distinctive.

C. majalis L. was introduced into Russian medicine by Botkin and later (1881) by Bogoyavlenskii. The flowers of the lily-of-the-valley are used both fresh and dried. An infusion made of fresh flowers exerts a stimulating and regulatory effect on cardiac action. The flowers contain two glucosides, 0.2 per cent of convallarin and convallamarin, as well as the alkaloid maialin and an essential oil. These components of the flowers are toxic.

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Genus 294. **PARIS*** L.**

L. Sp. pl. (1753) 367.

Perennial; rhizome long creeping, covered with scales; stem 15–30 cm long, erect, bearing at the ends 4–10 leaves, leaves obovate, short-acuminate; flowers solitary; perianth segments 8 or rarely 4, the outer broadly lanceolate green, the inner linear yellowish-green; stamens 6–10; filaments short, flattened, inserted at base of perianth; anthers linear, as long as or slightly longer than filaments, prolonged into a long point; styles 3–5, connate at base; fruit a glaucescent-black many-seeded berry; seeds ovaloid, concave.

* From Latin par, referring to the even number of leaves and perianth segments.

** Arranged by O.E. Knorring.

1. Perianth uniseriate . . . . . 3.
+ Perianth biseriate . . . . . 2.
2. Outer perianth segments lanceolate; aristate point of stamens the length of anther . . . . . 1. P. quadrifolia L.
+ Outer perianth segments ovaloid-pointed or ovoid; aristate point of stamens mostly shorter than anthers . . . . . 4. P. manshurica Kom.
3. Leaves obovate, pale green, dull beneath; filaments much shorter than anthers. . . . . 2. P. incompleta M.B.
+ Leaves lanceolate, strongly tapering to a point, pale green on both sides; filaments as long as or slightly shorter than anthers . . . . . 3. P. hexaphylla L.

1. **P. quadrifolia** L. Sp. pl. ed. I (1753) 367; Ldb. Fl. Ross. IV, 120; Boiss. Fl. Or. V (1867); Shmal'g., Fl. II (1897) 482; Kryl., Fl. Zap. Sib. III, 657. — P. dahurica Fisch. in Bull. Soc. Nat. Mosc. II, 201. — P. verticillata M.B. Fl. taur.-cauc. III, 287; Ldb. Fl. Ross. IV (1841) 121. — P. obovata Ldb. Fl. Ross. IV, 120. — Ic.: Ldb. Ic. Fl. Ross. I (1829) tab. 16; Syreishch., Fl. Mosk. gub. I (1906) 245; Redouté Liliac. IV, tab. 226. — Exs.: Pl. Finl. exs. No. 577.

Perennial, glabrous, 15–35 cm tall; leaves in terminal whorls of mostly 4 (in var. obovata Ldb. (pro sp.) in whorls of 5–8, in var. genuina Maxim. 4 or rarely 5), obovate, short-petioled, narrowly acuminate, 5–14 cm long, 2–8 cm broad, distinctly 3-nerved; perianth biseriate of 4
470 outer lanceolate green segments and 4 inner segments or 10-merous (v. obovata Ldb.), the filaments short; anthers long, linear, terminating in a sharp point the length of anther; styles 4, connate at base, shorter than stamens, recurved at the ends; fruit a glaucescent-black berry. May-June. (Plate XXIX, Figure 1, a, b).

Birch, mixed or coniferous woods and coppices in wet places. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U.V., V.-Ka., U. Dnp., M. Dnp., V.-Don, U.V., Bl.; Caucasus: Cisc., Dag.; W. Transc.; W. Siberia: Ob, U. Tob.; E. Siberia: Lena-Kol., Ang.-Say., Dau. Gen. distr.: Scand., Centr. Eur., Med. Described from Europe. Type in London.

Note. P. quadrifolia is very variable and comprises a number of intermediate forms between the varieties and allied species. Thus, in collections from a single location, one may find specimens with a larger number of perianth segments and stamens as well as a most varied leaf shape.

2. **P. incompleta** M.B. Fl. taur.-cauc. I (1808) 306; Ldb. Fl. Ross. IV, 121; Boiss. Fl. Or. V (1884) 331; Shmal'g. Fl. II, 482; Grossg., Fl. Kavk. II (1928) 242. — P. apetala Hoffm. in Comm. Phys. Med. Mosc. I (1808) 5. — P. octophylla Hoffm. Hort. Mosq. (1808) 27. — Ic.: M.B. Cent. Pl. Rar. II–III (1843) tab. 74. — Exs.: Pl. or. exs. No. 330; Fl. cauc. exs. No. 30.

Perennial, 15–20 cm tall; leaves obovate or oblong-oval, 10–13 cm long, 8–2.5 cm [?] broad, pale green, distinctly 3-nerved, short-acuminate, narrowed at base into a short petiole, dull beneath, in terminal whorls of 6–12; perianth of 4 outer lanceolate to ovate-lanceolate segments, 3–3.5 cm long and 1–1.5 cm broad; anthers much shorter than filaments, terminating in a very short point; styles greatly exceeding the stamens; fruit a glaucesccent-black berry. March-April. (Plate XXIX, Figure 3).

Plate XXIX

1. Paris quadrifolia L.: 1a) flower in section; 1b) stamens.– 2. Convallaria majalis L.: 2a) flower in section.– 3. Paris incompleta M.B.– 4. Trillium kamtschaticum Pall.; 4a) flower with perianth removed.– 5. Smilax excelsa L., 5a) flower.– 6. Dioscorea caucasica Lipsky, 6a) flower.– 7. D. batatas Dcne., 7a) flower.– 8. D. polyatachya Turcz., 8a) flower.

Shady woods, up to 2000 m. — Caucasus: Cisc., Dag., W. Transc. Described from the Caucasus (Tiflis). Type in Leningrad.

3. **P. hexaphylla** Cham. in Linnaea VI (1831) 586; Ldb. Fl. Ross. IV, 120; Kom., Fl. Manchzh. I (1901) 484–485. — Ic.: Kwa-wi (transl. Savatier) Herb. II (1759) tab. 5.

473 Perennial, 16–17 cm tall; leaves lanceolate, pale green, strongly tapering to a point, serrate, in terminal whorls of 4–8, 4–6.5 cm long, 1.5–2 cm broad; perianth of 4 rather narrow lanceolate segments, 1.5 cm long, 0.25 cm broad; stamens 8; filaments as long as or shorter than anthers; extension of connective shorter than anthers; styles united at base, deeply parted above, slightly recurved; fruit a bluish-black berry. June.

Mixed or coniferous, rarely broad-leaves woods. — Far East: Ze.-Bu., Uss., Okh., Sakh. **Gen. distr.**: China. Described from plants collected by Chamisso on the way from Yakutsk to Okhotsk. Type in Leningrad.

Note. This species is distinguished by its general aspect: the plants are more slender and rather low, while the narrowly lanceolate leaves are pale in color. There are a number of intermediate forms between P. hexaphylla and the species P. quadrifolia and P. manshurica.

4. **P. manshurica** Kom. sp. nova in Addenda III, p. 748; Kom. et Al., Opred. rast. Dal'nevost. kr. I (1931) 385.

Perennial; 30–38 cm tall; leaves in terminal whorls of 4–8, obovate, short-acuminate, 9–11 cm long, 3–6 cm broad, serrulate, narrowed at base into a rather short petiole; flowers solitary, long-peduncled; perianth segments 8, of these 4 large, oval-pointed or ovate, green or purple, and 4 inner ones narrowly lanceolate; stamens 8; anthers linear, mostly longer than or as long as filaments, obtusely short-acuminate, the extension of connective elongating in maturity. May-June.

Coniferous and mixed woods, more rarely coppices. — Far East. Uss. **Gen. distr.**: Manchuria and Korea. Described from Ussuri area. Type in Leningrad.

Genus 295. **TRILLIUM** * L.**

Sp. Pl. ed. I (1753) 329.

Rhizome stout; stem with numerous brown scales at base; perianth segments 6, the outer 3 greenish herbaceous, the inner 3 white petaloid; stamens 6, inserted at the base of perianth; pedicels short and stout; ovary 3-celled; seeds numerous, globose.

1. **T. kamtschaticum** Pall. in Herb. Lamb. ex Pursh. Fl. Am. Sept. I, (1814) 246; Miyabe et Miyake Fl. Saghal. 481; Miyabe and Kudo Fl. of Hokkaido in Journ. Fac. Agr. Hokk. Imp. Univ. XXVI 3 (1932) 342. — T. Pallasii Hultén. Fl. of Kamtsch. I (1927) 252. — T. obovatum (non Pursh) Kunth Enum. pl. V (1833) 124 p.p.; Ldb. Fl. Ross. IV, 124; Kom. Fl. Kamtsch., I, 305. — Ic.: Kom. l.c. tab. X.

* From Latin tres, three, and lilium, lily, the parts being predominantly in threes.

** Arranged by O.E. Knorring.

474 Perennial, 15–35 cm tall; rhizome stout, tuberlike; stems ribbed, clothed at base with numerous dry brown scales, 5–8 cm long; leaves 3, broadly oval-rhomboid, sessile, reticulately veined, 8–10 cm long, and 7–9 cm broad, gradually acuminate, sometimes obtusely tipped, dull green beneath, dark green above; flowers solitary; perianth segments 6, the outer 3 pale green oblong, the inner 3 much larger obovate or oval; anthers linear, 2–3 mm long; filaments short; ovary ovaloid; stigma sessile, 3-lobed; fruit a 3-celled green berry. May-June. (Plate XXIX, Figure 4 a).

Coniferous woods, in moss-covered soil.— Far East: Sakh., Kamch. Gen. distr.: N. Japan. Described from Kamchatka.

2. **T. rhombifolium** Kom. sp. nova in Addenda III, p. 748. Differing from the preceding species in having a stouter rhizome, broad leaves, and narrower perianth segments. Described quite recently from Ussuri (Suputinka).

Subfamily 6. **Smilacoideae** ENGL.

Perianth distinct or united; stamens 6, occasionally 3 or up to 15; berry with 1–3 spherical or hemispherical seeds. Erect or creeping shrubs or herbs, branched, profusely leafy; leaves reticulately veined; inflorescence a raceme or umbel, borne on an axillary peduncle; tendrils paired, from the margin of leaf base.

Genus 296. **SMILAX*** (TOURN.) LINN.**

Linn. Syst. ed. I (1735)

Glabrous shrubs, with twinning stems; leaves petiolate, alternate, coriaceous, reticulately veined, cordate at base, with a pair of tendrils at the leaf base; flowers dioecious, in axillary racemed umbels; perianth segments 6; stamens 6, inserted at base of perianth; stigma 3, sessile, recurved; fruit a 3-celled berry; seeds ellipsoid.

1. Stems obscurely tuberculate, prickly; peduncles 1–2 cm long . . . . . 1. **S. excelsa** L.

\+ Stems strongly tuberculate, unarmed; peduncles 2.5–4.5 cm long. . . . . 2. **S. Oldhami** Miq.

1. **S. excelsa** L. Sp. pl. ed. I, 1458; Ldb. Fl. Ross. IV, 129; Boiss. Fl. Or. V (1884) 342; Shmal'g., Fl. II, 477; M. B. Fl. taur.-cauc. III (1819)
475 632.— Ic.: Engler und Drude, Veget. Erde, XI (1909) tab. 9.— Exs.: HFR No. 1745.

Perennial, 2–3 mm [?] tall, destitute of pubescence; stems creeping, prickly, 4–8 mm [?] long; leaves cordate-ovate or broadly ovate, 6–8.5 cm long, 4–8 cm broad, mucronate, reticulately veined, the petiole 1–1.5 cm long, with tendrils at base; flowers 4–10, in umbels; peduncles 1.5–2 cm long; pedicels 5–7 mm long; perianth of 6 segments, petaloid, greenish;

* From Greek s m i l e x , name for yew (mentioned by Dioscorides).

** Arranged by O.E. Knorring.

stamens 6, inserted at the base of perianth; stigmas 3; fruit a 1–3-celled red berry. Fl. May. (Plate XXIX, Figure 5, a).

Associated with damp woods, wood margins, and river valleys, climbing high up the trees and forming dense curtains. — Caucasus: Cisc., Dag., W. and E. Transc., Tal. Gen. distr.: W. Med., Asia Minor, Iran. Described from Europe. Type in London.

2. **S. Oldhami** Miq. in Versl. Med. Kon. Acad. Wetensch. VI (1868) 86; Prol. Fl. Japon. II (1867–1868) 314; Kom., Fl. Manchzh. II (1904) 486. — S. excelsa v. ussuriensis Maxim. Mém. de l'Acad. VII, t. IV (1862). — S. herbacea v. Oldhami Maxim. Mélang. biolog. VIII (1872) 413.

Perennial, 2–3 m tall; stems sturdy, strongly furrowed, glabrous, unarmed; leaves cordate-ovate, broadly ovate or sometimes lanceolate, 6–8.5 cm long, 4–8 cm broad, mostly strongly tapering toward apex, occasionally broadly ovate and obtusely mucronulate, coriaceous, reticulately nerved, on petioles 5–6 mm long or sometimes sessile, with tendrils at base; flowers 19 or more, axillary; peduncles 4–5 cm long, sometimes 2–2.5 cm long, $2\frac{1}{2}$–3 times the length of pedicels; perianth of 6 segments; stamens 6, inserted at base; fruit a black berry. Fl. May-June.

Water meadows, riverside woods, and shrub thickets. — Far East: Uss. (S.), Gen. distr.: Japan. Described from plants collected by Oldham in Korea.

Family XXXIV. **AMARYLLIDACEAE** LINDL.

In main features closely resembling Liliaceae. The stamens in some representatives of the family transformed into staminodes, their number rarely exceeding 6; anthers mostly introrse; stamens often with extensions united to form a staminal corona; ovary inferior, rarely half-inferior; ovules in two series; capsule loculicidal, in few members of the family transformed into a berry; seeds few; pollen grains biseriate; embryo sacs
476 mostly paired. About 1000 species, distributed through dry semidesert and steppe regions, especially numerous in southern Africa and in Mexico. Nearly all are ornamental and are grown in greenhouses, in houses and in gardens. Some are of importance as fiber plants. The USSR representatives of the family are all bulbous.

1. Corolla without corona . . . . . 2.
+ Corolla with corona, this sometimes reduced to a ring . . . . . 6.
2. Stems leafy; leaves grasslike; corolla funnelform; androecium of alternating long and short stamens . . . . . 301. **Ixiolirion** Fisch.
+ Stem replaced by a leafless scape . . . . . 3.
3. Corolla tube elongated; stamens inserted at the level of ovary; seeds flattened; flowers solitary . . . . . 300. **Sternbergia** Waldst. et Kit.
+ Corolla tube very short or none; stamens inserted above the ovary. . . 4.
4. Perianth somewhat irregular, with a short curved tube; umbel few-flowered, enveloped in a spathe . . . . . 299. **Ungernia** Bge.
+ Flowers solitary or few; perianth regular; seeds globose . . . . . 5.

5. Inner perianth segments differing from the 3 outer segments; flower nearly always solitary, enclosed in a 2-leaved involucre . . . . . 297. **Galanthus** L.
+ All 6 perianth segments equal; flowers nodding or [?] slightly sagittate at base . . . . . 298. **Leucojum** L.
6. Stamens inserted within the cup-shaped corona, this borne on the throat of a long perianth tube at the base of perianth segments . . . . . 302. **Narcissus** L.
+ Stamens inserted on the upper edge of corona, this rather reduced . . . . . 303. **Pancratium** L.

Genus 297. **GALANTHUS** * L.**

Perennial; bulbs small, 2–3 cm in diameter; leaves 2, erect; linear or oblong-lanceolate, arising from a truncate cylindric sheath; scape bearing a solitary flower; peduncle slender, twisted at base, borne in the axil of a floral leaf, this lanceolate, hyaline, with 2 green marginal nerves;
477 perianth 6-merous; outer segments oval or ovate, concave, 15–30 mm long, white; inner segments cuneate-obovate, notched at apex, narrowed toward base, erect, with convergent margins and a green spot in upper part; anthers borne on short filaments at the base of perianth segments, enlarged toward base, strongly tapering upward, mostly mucronate; ovary 3-celled, spherical or oblong; style filiform; stigma pointed; seeds globose.

All species are of value as decorative plants.

1. Leaves flat . . . . . 2.
+ Leaves plaited . . . . . 5.
2. Leaves of equal breadth throughout; anthers subulate-tipped . . . . . 4.
+ Leaves broad in upper part, tapering downward into a petiole; anthers obtuse . . . . . 1. **G. latifolius** Rupr.
3. Scape shorter than or equaling the leaves; anthers subulate-tipped. . . . . 2. **G. transcaucasicus** Fomin.
+ Scape exceeding the leaves at anthesis; anthers subulate-acuminate . . 4.
4. Leaves 10–15 mm broad; outer perianth segments 15–18 mm long, 11–12 mm broad . . . . . 4. **G. caucasicus** (Bak.) Grossh.
+ Leaves to 10 mm broad; outer perianth segments 12–13 mm long, 8 mm broad . . . . . 3. **G. nivalis** L.
5. Anthers subulate-acuminate; leaves of equal breadth throughout . . . . 6.
+ Inner anthers subobtuse, the outer pointed; leaves broadest in upper one-third . . . . . 5. **G. alpinus** Sosn.
6. Leaves pruinose, plicate while still enclosed in sheath, at anthesis much shorter than stem, the plaits introrse . . . . 6. **G. plicatus** M.B.
+ Leaves pale green, without bloom, equaling or exceeding the stem, plicate after flowering, the plaits extrorse . . . .7. **G. Woronowii** A. Los.

1. **G. latifolius** Rupr. in Gartenflora XVIII (1868) 130. — Ic.: Gartenflora (1868) t. 578.

Perennial; bulb large (3 cm in diameter), elongated, the outer scales light-colored; leaves dark green, lustrous, broadly oblong-lanceolate, flat,

* From Greek gala, milk, and anthos, flower,
** Arranged by A.S.Lozina-Lozinskaya.

mucronate, to 20 cm long, 3 cm broad, tapering downward into a petiole; scape equaling or slightly surpassing the leaves; flowers rather small; outer segments narrowly elliptic, 15–20 mm long, 6–8 mm broad, tapering
478 at both ends; inner segments one-third as long as the outer, strongly emarginate or subobtuse, the green spot very small or absent; anthers slightly narrowed at summit, without a subulate point. April-May.

Alpine and subalpine zone. — Caucasus: E. and W. Transc. Endemic. Described from Ossetia.

2. **G. transcaucasicus** Fomin in Fomin and Voronov, Opred. Rast. Kr. i Kavk. I (1909) 281.

Perennial; leaves intensely green, dull, linear, carinate, to 1.5 cm broad, slightly canaliculate, obtuse; scape shorter than to slightly exceeding the leaves; flowers large; outer segments 2–2.5 cm long, oblong-oval; inner segments emarginate, two-thirds as long as the outer, the green spot semicircular and enlarged downward; anthers with a subulate appendage. February-March.

Woods in the foothills. — Caucasus: E. Transc., Tal. Endemic. Described from Talysh. Type in Tiflis.

3. **G. nivalis** L. Sp. Pl. ed. I (1753) 288; Ldb. Fl. Ross. IV, 13. — G. plicatus Hohenack. in Bull. Soc. Nat. Mosc. VI (1833) 228. — Ic.: Rchb. Ic. Fl. Germ. IX, t. 363; Redouté Lil., t. 200.

Perennial; bulb not more than 1 cm in diameter, the outer scales brown; leaves linear, to 1 cm broad, flat in vernation, carinate, subobtuse, at anthesis pruinose; scape variable in length, terete, at anthesis twice the length of leaves; outer perianth segments obovate-oblong, narrowed toward base, revolute at apex and thus apparently acute, 15–20 mm long, 8 mm broad; inner segments half as long as the outer, cuneate-obovate, strongly cordately emarginate, the green spot reniform-cordate or cordate; anthers mucronate. January-April.

Damp soil in woods. — European part: L. Don (S.); Caucasus: Cisc., W. Transc. (Abkhazia, Batumi, Ossetia), E. Transc. (Tiflis). Gen. distr.: Eur., E. Med. Described from Europe. Type in London.

Note. Grown in gardens. Valued as a harbinger of spring.

4. **G. caucasicus** (Baker) Grossh., Fl. Kavk. I (1928) 244. — G. nivalis var. caucasicus Baker, Handb. of Amaryl. (1888) 16. — G. nivalis β major Redouté et var. caspicus Rupr. in Gardenfl. XVII (1868) 131, 132. — Exs.: Fl. cauc. exs. No. 78.

Perennial; bulb 1.5 cm in diameter, the outer scales light brown; leaves linear, 1.5–2 cm broad, flat, carinate, obtuse, at anthesis pruinose, finally with an oily sheen; scapes cylindric, at anthesis exceeding the leaves,
479 finally becoming much elongated; flowers larger than those of G. nivalis L.; outer perianth segments obovate-oblong, to 25 mm long; inner segments half as long as the outer, obovate-cuneate, slightly emarginate, the green spot broadly reniform-obcordate; anthers mucronate. January-February.

Woods in the middle and lower mountain zone. — Caucasus: W. and E. Transc. Gen. distr.: N. Iran. Described from Transcaucasia.

5. **G. alpinus** Sosn. in Monit. Jard. Tifl. 19 (1911) 26.

Perennial; bulb large, ovoid, the outer scales brownish; scapes 6–8 cm long; leaves broadly lance-spatulate, broadest in upper one-third, subacute, pruinose, nearly flat in distal part, carinate and with 2 lateral plaits in lower part, 8–9 cm long, 2 cm broad, finely cartilaginous on the margin, at anthesis shorter than scape; outer perianth segments broadly spatulate, tapering toward base, obtuse, spoon-shaped, ca. 1.5 cm long; inner segments about half as long as the outer, with a triangular sinus and a narrow horseshoe-shaped green spot; outer anthers mucronulate, the inner subobtuse; flowers with a strong bitter almond scent. April.

Alpine meadows. — Caucasus: E. Transc. (Georgia). Endemic. Described from vicinity of Borzhomi. Type in Tiflis.

6. **G. plicatus** M.B. Fl. taur.-cauc. III (1819) 255; Ldb. Fl. Ross. IV, 114; Shmal'g., Fl. II, 473. — G. nivalis L. ssp. plicatum Gottlieb.v. Tan. Mon. Am. (1904) 35, 65. — Ic.: Gartenfl. (1863) t. 400; Bot. Mag. t. 2191. — Exs.: Gallier, Iter. Taur. II No. 497.

Perennial; bulb large, oblong, to 3 cm in diameter, the outer scales light-colored; scapes 25–30 cm long, terete, pruinose; leaves dark green, pruinose, cartilaginous, introrsely plicate, strongly carinate, gradually acuminate, slightly callous-tipped, conduplicate in vernation, at anthesis half as long as the scape; floral leaf 35 mm long, with lateral nerves about 1.5 mm thick, at anthesis greatly exceeding the peduncle, this later elongating to 3 cm; outer perianth segments to 25 mm long and 14 mm broad, oval; inner segments narrowed toward base, cordate and reflexed at apex, involute at the margins, the green spot deeply and broadly cordate; anthers subulate-tipped; flowers strongly scented. March-April. (Plate XXX, Figure 7, a, b, c).

In the shade of shrubs and in the woods of the Crimea. Endemic. Described from the Crimea. Type in Leningrad.

7. **G. Woronowii** A. Los. sp. nova in Addenda III, p. 749. — G. plicatus Philippov Fl. cauc. critica 44, III (1916) 6; Wulf. Fl. Taur. v. I, 2 (1928) 62; Voron. and Fom., Opred. rast. Kr. i Kavk. I (1909) 280, non M.B.

480 Perennial; bulb large, 3 cm in diameter; the outer scales yellowish; scapes 20–25 cm long, slightly ribbed; leaves linear, gradually acuminate, callous-tipped, 1.5 cm broad, pale green, initially flat, 20–25 cm long, after anthesis exceeding the scape and becoming introrsely plaited; outer perianth segments 20 mm long, 13 mm broad, ovate-ovate; inner segments 11 mm long, 8 mm broad, cuneately narrowed toward base, flat, cordate at apex, the cordate green spot truncate at base; anthers mucronate; flowers with an agreable scent. January-February.

Woods in foothills. — Caucasus: W. Transc. Endemic. Described from Sochi. Type in Leningrad.

Genus 298. **LEUCOJUM** * L.**

L. Syst. ed. I (1735) et in Sp. pl. (1753) 289.

Perennial; bulbs small or fairly large, the outer scales white membranous; leaves 2–4, linear; flowers several or solitary; perianth

* From Greek leuco, white, and coum, violet.

** Arranged by A.S. Lozina-Lozinskaya.

broadly campanulate; perianth segments overlapping, white, tipped yellow or green; anthers opening at apex; style clavate; ovary 3-celled, many-ovuled; capsule fleshy, loculicidal; seeds globose, black.

1. Flowers in umbels of 3–8; scape to 40 cm long. . . . . 1. **L. aestivum** L.
+ Flowers solitary, rarely paired; scape to 20 cm long . . . ★**L. vernum** L.

1. **L. aestivum** L. Syst. Nat. ed. 10 (1759) 975; Boiss. Fl. Or. V, 143; Shmal'g., Fl. II, 473; Grossg., Fl. Kavk. I, 244. — Nivaria monadelpha Medic. Acta Palat. VI (1790) 422. — Ic.: Rchb. Ic. IX, 362, f. 805.

Perennial; bulb ovoid, to 3 cm broad; scapes to 40 cm long or longer, slightly compressed; leaves broadly linear, lustrous, green, to 1 cm broad, often exceeding the scape; bracts lanceolate, to 5 cm long; peduncles fairly long, nodding; flowers in an umbel of 3–7; perianth segments broadly oblong, to 5 cm long, white, tipped green; stamens half the length of perianth segments, the filaments shorter than the anthers; capsule subspherical, to 1.5 cm broad, April-May. (Plate XXX, Figure 6, a, b).

Wet meadows among lowland valleys. — European part: Crim.; Caucasus: Cisc., W. Transc. **Gen. distr.**: Atl. Eur., Med., Bal.-As. Min., Iran. Described from S. Europe.

481 ★ **L. vernum** L. Sp. pl. ed. I (1753) 289; Shmal'g., Fl. II, 478. — Ic.: Rchb. IX, tab. 362, f. 804.

Perennial; bulb to 2 cm in diameter, spherical; leaves 3 or 4, to 1 cm broad, broadly linear; flowers solitary, rarely in pairs; perianth turbinate; seeds light-colored, with a rostrate appendage. February-May.

Growing wild in SE part of Poland, near Volhynia. — **Gen. distr.**: Central and partly S. Europe. Grown in parks and gardens; becoming readily naturalized.

Genus 299. **UNGERNIA** BGE.*

Bge in Bull. Soc. Nat. Mosc. XLIX, 2 (1875) 271; Boiss. Fl. Or. V (1884) 149.

Perianth funnelform without corona, nearly regular, the more or less curved tube shorter than the limb; stamens 6, inserted at the middle of the tube, the inner longer; anthers dorsifixed slightly below the middle; ovary 3-celled, many-ovuled; stigma subcapitate; capsule 3-lobed inflated; seeds flat. Bulbous plants. Leaves appear in spring and wither with the approach of summer; a leafless scape, bearing a few-flowered umbel and at first enclosed in a spathe, develops after an interval of 1 or 2 months.

Economic importance. The bulbs of Ungernia are used for the production of glue. The large-sized and, as a rule, profusely formed bulbs of this genus are undoubtedly of technological value and ought to be subjected to detailed chemical analysis.

Note. As a result of studies on live plants in natural conditions and, more particularly, on material that has accumulated in recent years in the Botanical Garden of the Central Asian National University, a considerable number of Ungernia species have been found to grow in Soviet Central Asia. It is now perfectly clear that unification of the already described species, U. trisphaera and U. Severtzovii, as proposed by

* Arranged by A.I. Vvedenskii.

B. A. Fedchenko (Rast. Turk. (1915) 256), is quite inappropriate. To judge by the already known material, the species presented here do not provide a full cover of the taxonomic composition of the Central Asian ungernias. In the spring of 1931 the author saw in the Turkmen Botanical Garden several live specimens from Androsov's Kopet Dagh (Gyuen) collections*, which undoubtedly represent a new Ungernia. To the author's knowledge, none of the known species has such dense 2-ranked coiled glaucous leaves.

The author deals with other incomplete data, referring to more or less disjointed locations, in notes to individual species.

1. Leaves borne around the stem and forming an apparent rosette, the outer several times as broad as the inner. . . . . 1. **U. trisphaera** Bge.
+ Leaves in 2 ranks, the outer not more than twice as broad as the inner. . . . . 2.

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2. Perianth segments plain brick-red, in drying purple-tinged; stem terete. . . . . 6. **U. Severtzovii** (Rgl.) B. Fedtsch.
+ Perianth segments plain pale ochrous, yellowish or rosy-yellowish, or with a brownish or purplish band on both faces . . . . . 3.
3. Stem 5–10 cm long; leaves 8–12 mm broad; bulbs 2–4 cm in diameter; perianth segments brownish-banded on both faces . . 4. **U. minor** Vved.
+ Outer leaves 1.5–4 cm broad; bulbs 4–10 cm in diameter; perianth segments plain or with a purple or rosy-purple band on the inner face. . . . . 4.
4. Capsule 3–3.5 cm in diameter; perianth segments purple-tipped . . . . . 5. **U. ferganica** Vved.
+ Capsule 2 cm in diameter; perianth segments with a purple or rosy-purple band on the inner face . . . . . 5.
5. Stem 5–10 cm long; umbel (2) 4–7-flowered, subsecund; leaves 2–3 cm broad; perianth segments 20–25 cm long . . . . . 3. **U. Victoris** Vved.
+ Stem 25–30 cm long; umbel 7–17-flowered; leaves 2.5–4 cm broad; perianth segments 25–30 mm long . . . . . 2. **U. tadshikorum** Vved.

1. **U. trisphaera** Bge in Bull. Soc. Nat. Mosc. XLIX 2 (1875) 273.

Perennial; bulbs oblong-ovoid, 7–12 cm in diameter, the numerous blackish-brown membranous coats strongly produced at the neck; leaves 8–15, apparently rosulate, linear, glaucescent, smooth, the outer (3)–4–5 cm broad, several times as broad as the inner leaves, 25–40 cm; long; stem terete, scarcely tapering toward summit, often reddish, 10–25 cm long; spathe 2-cleft, shorter than the long pedicels; umbel (5)–10–20-flowered; pedicels unequal, 2–5 cm long, subtended by few short bracts; perianth segments 20–25 mm long, 5–8 mm broad, 2–3 times the length of the tube, lanceolate, acutish to obtusish, brighter-colored within, in drying becoming purple-tinged; capsule ca. 2 in diameter, with cordate valves. August.

Consolidated sands and bedrock outcrops. — Centr. Asia: Mtn. Turkm. (Sary-yazy, Kushka, Pul'-i-khatum, Serakhs, Kaakhka Yablonovskoe). **Gen. distr.**: Iran, NE Khurasan. Described from Meshed. Type in Leningrad.

483 Note. Description based on live specimens grown in the Botanical Garden of the Central Asian State University, from bulbs gathered in Kushka.

2. **U. tadshikorum** Vved. in Sched. H. F. A. M. (1935) No. 650.

* See the author's note in Fl. Turkm. II (1932) 317.

Perennial; bulbs oblong-ovoid, 7–10 cm in diameter, with numerous blackish-brown membranous coats; leaves 8–12, 2-ranked, linear, glaucescent, smooth, slightly crisped, subequal, the outer 2.5–4 cm broad, 25–30 cm long; stem compressed, strongly tapering toward summit, (15)–25–35 cm long, yellowish-green; spathe 2-cleft, shorter than the pedicels; umbel 7–17-flowered, divaricate; pedicels very unequal, 2–7 cm long elongating in fruit to as much as 14 cm, yellowish, subtended by numerous long bracts; perianth segments 25–30 mm long, 5–7 mm broad, 3 times the length of the tube, narrowly lanceolate, acutish, yellowish or rosy, with a broad purple median band on the inner face; capsule 2–2.5 cm in diameter, with cordate valves. July-August.

Clay slopes in the dry steppe mountain zone.— Centr. Asia: Pam.-Al. (Sanglok, Guli-zandan, Tevil'dar, Khodzha Mastan and other places). Endemic. Described from Mount Sanglok. Type in Tashkent.

Note. Description based on live specimens grown in the Botanical Garden of the Central Asian State University, from bulbs collected by Granitov in the Sanglok mountains. Closely related to the preceding species, the outstanding feature being the larger size of all parts.

3. **U. Victoris** Vved. in Sched. H. F. A. M. (1935) No. 650.

Perennial; bulbs ovoid, 4–7 cm in diameter, the rather numerous brown membranous coats more or less produced at the neck; leaves 7–10, 2-ranked, glaucous, smooth, scarcely crisped, subequal, the outer 2–3 cm broad, 20–25 cm long; stem compressed, 5–10 cm long; spathe 2-(3)-cleft; longer than the pedicels; umbel (2)–4–7-flowered, subsecund; pedicels unequal, 2–5 cm long, subtended by long bracts; perianth segments 20–25 mm long, 4–6 mm broad, 2–3 times the length of the tube, narrowly lanceolate, acutish, yellowish or finally yellowish-rose, with a rosy-purple band on the inner face. August.

Mild slopes at altitudes of 2000–2500 m.— Centr. Asia: Pam.-Al. (Chul'bair mountains). Endemic. Described from Sina. Type in Tashkent.

Note. Description based on live specimens gathered by Vvedenskii in Chul'bair mountains near village of Sina.

The plant collected by Bobrov in Kugitang and recorded in the Flora of Turkmenistan (II (1932) 318) apparently belongs to this species.

484 4. **U. minor** Vved. in Sched. H. F. A. M. (1935) No. 650.

Perennial; bulbs ovoid, 2–4 cm in diameter, the rather few grayish membranous coats produced at the neck; leaves 3–5, 2-ranked, linear, glaucescent, smooth, subequal, the outer 8–12 mm broad, ca. 20 mm long; stem 5–10 cm long, elongating in fruit up to 15 cm; spathe 2-cleft, slightly exceeding the pedicels, rose-tipped; umbel 4- or 5-flowered, subsecund; pedicels unequal, 2–3.5 cm long, slightly 3-angled to subterete, pale rose, subtended by short bracts; perianth segments 20–25 mm long, 5–6 mm broad, 2–3 times the length of the tube, narrowly lanceolate, obtuse to acutish, pale yellowish or finally yellowish-rose, with a narrow brownish band on both faces, in drying becoming purple-tinged; capsule 2–2.5 cm in diameter, with broadly cordate valves. July-August.

Stony slopes, at altitudes of 1700–2300 m.— Centr. Asia: Pam.-Al. (Turkestan Range). Endemic. Described from Zaamin. Type in Tashkent.

Note. Description based on live specimens, grown in Tashkent from bulbs gathered by Popov in Zaamin woodland.

5. **U. ferganica** Vved. in Sched. H. F. A. M. (1935) No. 650.

Perennial; bulbs oblong-ovoid, 4–5 cm in diameter, the rather few blackish-brown coats produced at the neck; leaves (fully developed not seen) 10, 2-ranked, subequal, the outer ca. 1.5 cm broad; stem compressed, 10–20 cm long; spathe 2-cleft, shorter than the long pedicels; umbel loosely 5–15-flowered; pedicels very unequal, 1.5–8 cm long, ebracteolate or subtended by long solitary bracts; perianth segments 20–25 mm long, 3–4–5 mm broad, twice the length of the tube, linear-lanceolate to narrowly lanceolate, acutish, pale ochrous, purple-tipped within; capsule 3–3.5 cm in diameter, with broadly cordate valves. August.

Stony (and fine textured) slopes in the steppe mountain zone. — Centr. Asia: T. Sh. (Fergana Range). Endemic. Described from Kugart. Type in Tashkent.

Note. The author has seen only dried specimens and his conclusions concerning flower color are based chiefly on Titov's oral communication and on Korzhinskii's notes in the herbarium. Titov reported that the general impression suggested dingy yellow flowers. Korzhinskii writes; "flowers greenish, reddish-brown on the margins; purple-tipped". Herbarium specimens display darker hues on the back rather than at the margins.

485 6. **U. Severtzovii** (Rgl.) B. Fedtsch. in Rast. Turkm. (1915) 256 (excl. syn. U. trisphaera Bge.). — Lycoris Severtzovii Rgl. in Bull. Soc. Nat. Mosc. XLI, 1 (1868) 435. — Ic.: Gartenfl. XXVI (1877) t. 914.

Perennial; bulbs elongate-oblong, 5–7 cm in diameter, the rather few mostly coal-black membranous coats much produced at the neck; leaves 4–6, 2-ranked, glaucous, linear, smooth, slightly crisped, subequal, the outer 1.5–2 cm broad, ca. 20 cm long; stem terete, tapering toward summit, (15)–20–40 cm long; spathe 2-cleft, shorter than the pedicels; umbel (5)–7–12-flowered; pedicels very unequal, 2–8 cm long or in fruit up to 10 cm long, subtended by long bracts; perianth segments 20–25 mm long, 4–5 mm broad, 3 times the length of the tube, narrowly lanceolate, acutish, plain brick-red, in drying becoming purple-tinged; capsule 2–2.5 cm in diameter, with broadly cordate valves. July-August.

Stony and gravelly slopes in the steppe mountain zone. — Centr. Asia: T. Sh. (SW spurs of Talass Ala Tau, Chatkal Range). Endemic. Described from Chirchik. Type in Leningrad.

Note. The author saw live flowering plants in Chimgan and fruiting plants in Ugam. Knorring gathered in 1932, in the Nura-tau mountains (5 km from Koshbarat), a fruiting Ungernia that, judging by the characteristic slender black-coated bulbs, possibly belonged to this species. Also in need of further study are specimens from the W. part of the distribution area of U. Severtzovii (Dorofeevka, Ala-gushuk, Tyul'-kubas), since, the herbarium material suggests that their flowers are not unicolor.

Genus 300. **STERNBERGIA** * WALDST. et KIT.**

Waldst. et Kit. Fl. rar. Hung. II (1805) 172. — Oporanthus Herb. App. (Bot. Rgl.) (1821) 38.

Scape leafless, bearing a solitary flower enclosed in a spathe; perianth funnelform, the short straight tube gradually expanding, the regular limb

* Named for K. Sternberg (1761–1838) from Regensburg.

** Arranged by S.G. Gorshkova.

6-parted; stamens 6, of these 3 shorter, inserted on upper part of the perianth tube; anthers oblong, obtusish; style 3-angled; stigma 3-lobed; capsule somewhat fleshy, indehiscent; seeds subglobose. Bulbose perennials with narrowly or broadly linear obtuse basal leaves.

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1. Flowers in early spring, together with leaves; leaves flat, sometimes exceeding the scape . . . . . 1. S. **Fischeriana** (Herb.) Roem.
+ Flowers in fall . . . . . 2.
2. Plants 5–9 cm tall; bulb spherical-ovoid to oblong-ovaloid; leaves narrowly linear, subobtuse, smooth-margined, appearing in spring after flowering; scape short, scarcely raised above ground . . . . . 2. S. **colchiciflora** Waldst. et Kit.
+ Plants 20–40 cm tall; bulb large, spherical; leaves broadly linear, cartilaginous-margined, appearing in fall toward the end of flowering; scape elongate, slightly shorter than the leaves . . . . . 3. S. **lutea** (L.) Ker.-Gawl.

1. **S. Fischeriana** (Herb.) Roem., Amaryll. (1847) 46; Filippov, Amaryllid Fl. caus. crit. 44, 11. — Amaryllis lutea M.B. Fl. taur.-cauc. III (1819) 255. — Oporanthus Fischerianus et O. luteus Fischerianus Herb., Amaryll. (1837) 412. — St. lutea Ldb., Fl. Ross. IV (1853) 115 (exclus. syn.). — St. Fischeriana Rupr., Gartenflora XVII (1808) 100. — Ic.: Herb., Amaryll. (1837) tab. 47, fig. 3 (sub. O. Fischerianus Herb.); Rupr. in Regel Gartenfl. XVII (1868) tab. 576 (sub St. Fischeriana Rupr.). — Exs.: Herb. Fl. Gauc. No. 20

Perennial, 20–35 cm tall; bulb large, spherical, enveloped in dark brown membranous coats; leaves broadly linear, flat, obtuse, entire, the base of leaves and scape enclosed in a leafless sheath; scape exceeding the leaves; spathe oval-lanceolate, obtuse, tubular at base, two-thirds the length of flower; flowers large, appearing with leaves in spring; perianth bright yellow, broadly funnelform, the tube very short, the segments obtusish; stamens half as long as anthers; ovary stipitate, oblong-ellipsoid, tapering at both ends, enclosed in the spathe. March.

Steppes and dry hills in the lower mountain zone. — Caucasus: E. Transc. **Gen. distr.**: Iran. Described from Karabakh, Akh-Oglan. Type in Leningrad.

2. **S. colchiciflora** Waldst. et Kit. Fl. rar. Hung. II (1805) 172, tab. 159; Ldb. Fl. Ross. IV, 115; Shmal'g., Fl. II, 473. — Ic.: Rchb. Ic. Fl. Germ. IX, tab. 372, Figures 823–24.

489 Perennial, 5–9 cm tall; bulb spherical-ovoid to oblong-ovaloid, 1–2 cm broad, enveloped in brown coats; leaves appearing in spring (the season following flowering), linear, 4–5 mm broad and 15 cm long, narrowed toward base, obtusish; flowers in fall; scape short, scarcely raised above soil level, with a short sheath; spathe as long as the tube of the sulfur-yellow perianth; perianth segments as long as or slightly longer than the tube, the outer acuminate, the inner obtuse; stamens one-third to one-half as long as the perianth; ovary sessile, oblong-ovaloid, enclosed in a spathe. September.

Plate XXX

1. Sternbergia lutea (L.) Ker-Gawl.– 2. Narcissus caucasicus (Fom.) Gorschk.– 3. N. pseudonarcissus L.– 4. Ixiolirion tataricum (Pall.) Herb.– 5. Pancratium maritimum L.– 6. Leucojum aestivum L.; 6a) bulb, 6b) leaf.– 7. Galanthus plicatus M.B.: 7a) outer perianth segments, 7a) inner perianth segments, 7c) style and stamens.

Dry stony steppes and meadows — European part: Bl., Crim., Caucasus: Cisc., E. Transc Gen. distr.: Med., Eur. Described from former Austro-Hungary, from Budaörs. Type in Vienna.

Note. N.A. Troitskii (Zhurn. Russk. Bot. O-va X (1925) 200) records that flowers of this species sometimes develop underground within the bulb, while the fruit is raised above soil level and there attains maturity.

3. S. **lutea** (L.) Ker-Gawl. in Roem. et Schult. Syst. VII, 2 (1830) 795; Ldb. Fl. Ross. IV, 115; Filippov, Fl. Cauc. crit. 44 (1916) 12.— Amaryllis lutea L. Sp. pl. (1753) 292.— Oporanthes lutea Herb. Appen. (1821) 38 et Amaryll. (1837) 188.— Ic.: Rchb. Icon. Fl. Germ. IX, tab. 373.— Exs.: HFAM No. 418.

Perennial, 9–20 cm tall; bulb large, 3–4 cm in diameter and 5 cm long, spherical, enveloped in dark brown coats; leaves broadly linear, 4–5 mm broad, concave, scaberulous-margined due to minute sharp teeth, appearing in fall together with flowers; scape elongated, slightly shorter than the leaves, both scape and leaves enclosed in a small leafless sheath; spathe oval-lanceolate, tubular at base, one-half to two-thirds the length of perianth; perianth yellow, ca. 5 cm long, broadly funnelform, with a very short tube and obtuse oblong-elliptic segments; stamens one-half to two-thirds as long as the perianth limb; ovary ovoid-oblong, enclosed in the spathe. September-October. (Plate XXX, Figure 1).

Dry steppe slopes.— Caucasus: E. Transc.; Centr. Asia: Mtn. Turkm., Pam.-Al. Gen. distr.: Med. Described from W. Europe. Type in London.

Genus 301. **IXIOLIRION*** FISCH.**

Fisch Herb. App. (1821) 37.— Amaryllis Pall. It. III (1776) 727.— Kolpakowskia Rgl. in A.H.P. V 2 (1878) 634.

Inflorescence mostly few-flowered, rarely paniculate; flowers large,
490 regular, bisexual; perianth 6-parted nearly down to base, funnelform-campanulate; segments 3-nerved, the 3 outer slightly narrower than the inner, mucronate; stamens 6, inserted at the base of perianth segments; ovary inferior, 3-celled, many-ovuled; style long, filiform; stigma 3-lobed; capsule coriaceous, oblong-clavate, narrowed at base, 3-valved, dehiscent at the top; seeds ovaloid-oblong. Bulbose perennials, the leafy stem with a membranous sheath at base; leaves borne mostly on the lower part of the stem, linear.

1. Plants 10–50 cm tall; leaves linear, rather narrow; flowers large, in a racemose or paniculate inflorescence; anthers oblong, straight or curved, 3-5 times as long as broad . . . . . 2.
+ Plants 5–10 cm tall; flowers rather small, in an umbelliform inflorescence; anthers rounded, straight, 2–3 times as long as broad. . . . . 1. I. karateginum Lipsky.
2. Bulb ovoid; flowers in racemose inflorescence; perianth segments bluish-violet to lilac, oblong-elliptic . . . . . 2. I. tataricum (Pall.) Roem. et Schult.
+ Bulb ovaloid; flowers mostly in a paniculate inflorescence; perianth segments azure-blue, oblong-linear . . 3. I. montanum (La Bill.) Herb.

* Ixia, a genus of the family Iridaceae, and Greek leirion, lily.

** Arranged by S.G. Gorshkova.

1. **I. karateginum** Lipsky, A.H.P. XVIII (1901) 108, No. 72. — Ic.: Lipsky A.H.P. XXIII (1904) tab. 11.

Perennial, 5–10 cm tall; bulb ovoid to ovoid-oblong, 1–1.5 cm in diameter and 1–2 cm long, covered with brownish scales; leaves 3 or 4, narrowly linear, attenuate toward apex, filiform-tipped, 2–3 times the length of stem or even longer; flowers 2–7, rather small, in an umbelliform inflorescence; bracts lanceolate, broadly membranous, shorter than to equaling the pedicels; claws of perianth segments folded into a tube in lower part, the longer upper part reflexed and thus the perianth rotate; segments pale lilac, the inner obovate and rather broad, the outer elongate elliptic, terminating in a greenish mucro; stamens unequal; anthers rounded, 2–3 times as long as broad, straight after anthesis; ovary oblong-ovaloid, July.

Mountains (3000–4000 m), on slightly gravelly grassy slopes. — Centr. Asia: Pam.-Al. Described from Karategin (Peter the Great Range, Kara-Shura River valley). Type in Leningrad.

2. **I. tataricum** (Pall.) Roem. et Schult. Syst. VII, 1 (1829) 752; Rgl. in A.H.P. VI, 2 (1880) 492; Filippov, Fl. cauc. crit. v. 44, 13; Krylov, Fl. Zap. Sib. III, 659. — Amaryllis tatarica Pall. It. III (1776) 727, tab. D, Figure 1. — I. Pallasii Fisch. et Mey, ex Ldb. Fl. Ross. IV (1853) 116; Shmal'g., Fl. II, 474. — I. Kolpakowskianum Rgl., A.H.P.
491 VI, 2 (1879) 494. — Ic.: Herb. Amaryllid. (1827) tab. 19; Fl. Yugo-Vost. pt. 3, 407, Figure 200. — Exs.: H.F.A.M. No. 419 (v. brachyantherium Rgl.).

Perennial, 20–45 cm tall; bulb deep-seated, ovoid, 1–1.5 cm broad, 1.5–2.5 cm long, covered with dark brown coriaceous coats; leaves linear, scabrous-margined, slightly canaliculate, finely pointed; flowers 2–4, pedicellate, in a racemose inflorescence or rarely in a many-flowered loose raceme, slightly open or wide open (var. Ledebouri Rgl.); segments of the campanulate perianth azure-blue to dark violet, 5–7 mm broad and 2–3 cm long, oblong-ellitpic, to lanceolate; anthers oblong to oblong-ovoid, straight, 3–5 times or 2–3 times (var. brachyantherum Rgl.) as long as broad, after anthesis straight or recurved at the middle (var. intermedium Rgl. and var. crispum Rgl.) or spirally arched-recurved (var. Ledebourii Rgl.); ovary oblong-obovoid, inferior. April, May, July, in mountains. (Plate XXX, Figure 4).

Terraces along waterways, sands, feathergrass-wormwood and wormwood-fescue steppes, and stony steppe slopes; in the mountains up to the subalpine zone. — W. Siberia: Irt., Alt., Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Kyz. K., Kara K., Mtn. Turkm., Amu D., Pam.-Al., T. Sh. **Gen. distr.**: Dzu.-Kash. Described from Inderskie mountains. Type in Leningrad.

3. **I. montanum** (La Bill.) Herb. App. (1821) 37 et Amaryll. (1837) 125. — Amaryllis montana La Bill. Ic. Syr. dec. (1791). — I. Pallasii Ldb. Fl. Ross. IV (1853) 116 (non Fisch. et Mey). — Ic.: Herbert. Amaryllid. (1837) tab. 20. — Exs.: Herb. Fl. Cauc. No. 21.

Perennial, 25–30 cm tall; bulb 1–1$\frac{1}{4}$ cm broad and 2–2$\frac{1}{4}$ cm long, ovaloid, covered with brown coats; leaves linear, narrow; flowers 3–17, pedicellate, in a narrow paniculate or rarely corymbose inflorescence; perianth azure,

elongate-funnelform, 3–4 cm long; segments oblong-linear, 3-nerved, the inner obtuse, the outer elongate and mucronate; anthers oblong-linear, straight, 4–5 times as long as broad; ovary oblong, inferior; capsule oblong-clavate. April, May, June.

Steppe mountain zone. — Caucasus; Centr. Asia: Mtn. Turkm. Gen. distr.: Bal.-As. Min., Iran. Described from the Lebanon Mountains in Syria [Lebanon]. Type in Paris.

Genus 302. **NARCISSUS*** L.**

L. Gen. pl. (1764) 161.

Flowers large; perianth with a long cylindric tube, a 6-parted limb,
492 and a campanulate or cup-shaped corona at the throat; stamens free from corona, inserted in perianth tube; ovary oblong or ovaloid, 3-angled, 3-celled, many-ovuled; style filiform; stigma truncate or somewhat 3-lobed; capsule 3-valved; seeds black, angled or globose. Bulbose perennials with linear basal leaves and an elongated leafless scape surrounded at base by membranous sheaths.

1. Scape bearing a solitary flower; corona campanulate or patelliform, with an incised or crenulate margin; perianth segments longer than the tube . . . . . 2.

\+ Scape bearing 5 flowers; corona cup-shaped, with an entire margin; perianth segments shorter than the tube . . . . . 1. N. caucasicus (Fomin.) Gorschk.

2. Perianth segments pale yellow; corona large, campanulate to cup-shaped, yellow, with irregularly incised undulate margin . . . . . 2. N. pseudo-narcissus L.

\+ Perianth segments white; corona small, patellate, yellow, with bright red crenulate margin . . . . . *N. poeticus L.

1. **N. caucasicus** (Fomin) Gorschk. comb. n. — N. lacticolor Baker var. caucasicus Fomin in Fomin and Voronov. Opr. rast. Kavk. i Kr. I (1909) 284; Filippov, Fl. Cauc., crit. 44 (1916) 16, 17.

Perennial; 35–55 cm tall; bulb large, $3\frac{1}{4}$–4 cm in diameter and 4–4.5 cm long, spherical-ovoid, covered with dark brown coats; leaves straight, broadly linear, 12 mm broad, obtuse, glaucous, flat, about equaling the scape; scape with an oblong spathe; flowers 5–7; pedicels elongated, unequal, longer than the spathe; perianth segments white or yellowish-white, broadly elliptic to suborbicular, obtuse, mucronulate, shorter than the tube; corona golden-yellow, cup-shaped, entire, slightly exserted from the perianth tube. March. (Plate XXX, Figure 2).

Caucasus: E. Transc. Endemic. Described from the Caucasus, Shemakha area and village of Akhsu. Type in Tiflis.

Note. Cultivated in gardens as an ornamental plant.

2. **N. pseudo-narcissus** L. Sp. pl. (1753) 289; Baker. Amaryll. (1888) 3; Ldb. Fl. Ross. IV, 116; Filippov, Fl. Cauc. crit. 44 (1916) 16. — Ic.: Rchb. Ic. Fl. Germ. IX, tab. 369, Figure 816; Hegi Fl. Mitt. Eur. II (1909) tab. 67, Figure 4.

* From Greek naren, numbness; named after the mythological hero Narcissus.

** Arranged by S.G. Gorshkova.

Perennial, 20–25 cm tall; bulb large, 3.5–4 cm in diameter, 4–4.5 cm long, spherical-ovoid, covered with dark brown coats; leaves straight, broadly linear, 7 mm broad, flat, subobtuse, shorter than the compressed
493 monanthous scape; spathe oval-lanceolate, obtuse, half the length of flower; perianth pale yellow; segments broadly lanceolate, obtuse, mucronate, longer than the tube; corona very conspicuous, cup-shaped to campanulate, yellow, with a regularly incised undulate margin. March. (Plate XXX, Figure 3).

Slopes. — Caucasus: E. Transc. Gen. distr.: Med. Described from W. Europe. Type in London.

*N. poeticus L. Spec. pl. (1753) 289; Shmal'g., Fl. II, 472. — Ic.: Rchb. Ic.: Fl. Germ. IX, tab. 364, Figure 808; Baillon Ic. Fl. Franc. I (1885-94) tab. 1.

Perennial, 20–30 cm tall; stem 2-angled, terminating in a spathe and a solitary nodding flower; bulb spherical-ovoid, covered with dark brown coats; leaves 2–4, elongated, bluish-green, linear, flat, subobtuse, about equaling the scape; perianth white; segments obovate, longer than the tube; corona rather small, patellate, yellow, with a bright red crenulate margin. March-April.

Grown in gardens, occasionally becoming naturalized. — European part: U. Dnp., M. Dnp. Gen. distr.: Centr. Eur., W. Med. Described from Europe. Type in London.

Note. Deserves to be cultivated on a large scale as one of the early spring-flowering plants. Survives in the ground even in the Leningrad area. A valuable source of essential oil.

***N. tazetta** L. Sp. pl. (1753) 290. —

Perennial; bulb 3–5 cm in diameter; stem compressed, 30–50 cm tall; leaves 4–6, linear, grayish-green, carinate, subobtuse, about as long as the scape; inflorescence of 3–18 flowers; pedicels unequal; perianth tube greenish, cylindric, ca. 2 cm long; segments horizontally spreading, obovate, white, varying in breadth; corona cup-shaped, mostly entire, golden-yellow; stamens and stigma exserted from the perianth.

Gen. distr.: Mediterranean Region, where it flowers from December to May. Growing in sun-exposed places, on slopes and in dry meadows. Described from S. Transc. Cultivated in the USSR in gardens along the Black Sea coast of the Caucasus.

Note. A beautiful and highly productive plant. In view of its winter blooming, it is likely to meet with extensive demand and, with the development of air transport, it may be rapidly transported from the south to the central parts of the USSR.

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Genus 303. **PANCRATIUM*** L.**

L. Gen. pl. (1764) 161 No. 404.

Flowers large, white, enclosed in a spathe; perianth with an elongated cylindric tube and a 6-parted limb; corona campanulate, split into teeth

* From Greek pan, all, and cratos, power.

** Arranged by S.G. Gorshkova.

and attached to base of perianth segments; stamens free or adnate to corona; ovary 3-celled, many-ovuled; style filiform; stigma somewhat 3-lobed; capsule ovaloid-trigonous, 3-celled, 3-valved; seeds subglobose. Bulbose perennials, with basal leaves and a stout leafless scape.

1. **P. maritimum** L. Sp. pl. I (1753) 291; Ldb. Fl. Ross. IV, 115; Filippov, Fl. cauc. crit. v. 44 (1916) 18. — Ic.: Rchb. Icon. Fl. Germ. IX, tab. 371, f. 821. — Exs.: Herb. Fl. cauc. No. 263.

Perennial, 40–60 cm tall; bulb large, 4.5–6 cm in diameter and 8–10 cm long, ovaloid-oblong, covered with numerous brown membranous coats; leaves straight, elongated, broadly linear, 20 mm broad, glaucous, shorter than to as long as the scape; spathe 2-valved, lanceolate, one-third to one-half the length of flower; flowers 2–8, subsessile; perianth funnelform, white; perianth tube long, expanding upward; perianth segments lance-linear, acutish, reflexed, green-banded on the back; corona with 12 acute triangular teeth, shorter than perianth segments. August. (Plate XXX, Figure 5).

Sandy seashores. — Caucasus: W. Transc. Gen. distr.: Centr. Eur., Med. Described from Spain. Type in London.

Family XXXV. **DIOSCOREACEAE** LINDL.*

Flowers unisexual, dioecious; perianth biseriate, 6-merous, deeply 6-parted; staminate flowers with 6 stamens and a rudimentary tubercle-shaped ovary; pistillate flowers with 6 minute staminodes; ovary inferior, 3-celled; styles 3, very short, distinct or united; stigmas 3; fruit a 3-celled 3-winged capsule or berry. Perennial lianous plants with a twining stem and underground rhizomes, tubers, or tuberous roots. Leaves alternate or opposite; flowers small, in simple or branched axillary spikes or racemes.

495 Key to Genera

1. Fruit a 3-winged capsule; seeds flat, winged; stamens inserted on the perianth tube . . . . . 304. **Dioscorea** L.
+ Fruit a berry; seeds globose, wingless; stamens inserted at bottom of perianth . . . . . 305. **Tamus** L.

Genus 304. **DIOSCOREA**** L.

L. Gen. ed. 1 (1737) 306; L. Spec. pl. (1753) 1032.

Perianth of staminate flowers campanulate, deeply 6-parted, the segments equal or nearly so; stamens inserted on the perianth tube, shorter than the segments; perianth of pistillate flowers 6-parted; ovary 3-celled, with 2 ovules in each cell; capsule 3-celled, 3-winged, the wings vertical, semioval or crescent-shaped; seeds flattened, winged; staminate flowers

* Arranged by N.F. Goncharov.

** Dedicated to the Greek physician Dioscorides who wrote, in the 1st century A.D., five books dealing with medicinal plants, etc. In the Middle Ages he was considered as the principal authority on plant science.

solitary or in glomerules of 2–4, forming simple or branched axillary spikes or racemes; pistillate flowers in simple spikes or racemes.

1. Wing of seeds the same breadth all round except on the inner side; capsules orbicular or cordate-orbicular . . . . . 2.

+ Wing of seeds very narrow in lower part, broad and elongated in upper part; capsules broadly oblong or oboval . . . . . 2. **D. polystachya** Turcz.

2. Male spikes mostly 2 to 4 in the leaf axils; perianth segments inflexed, their margins convergent; rachis of male inflorescences flexuous; capsules cordate orbicular. . . . . ★**D. batatas** Decne.

+ Male spikes mostly solitary in the leaf axils; perianth segments reflexed; rachis of male inflorescence not flexuous; capsules orbicular . . . . . 1. **D. caucasica** Lipsky.

Subgenus I. **HELMIA** (Kunth) Benth. in Benth. et Hook. f. Gen. III (1883) 743 (pro sectio). Knuth Monogr. in Pflzr. IV (1914) 50. — Wing of seeds retrorse.

1. **D. caucasica** Lipsky in Mém. Soc. Nat. Kiew XIII, 1 (1894) 143.— 154; Knuth Monogr. in Pflzr. IV, 43 (1924) 173. — Ic.: Mém. Soc. Nat. Kiew XIII, 1, t. 6, 7; Knuth Monogr. Figure 35. — Exs.: Fl. cauc. exs. No. 79.

496 Perennial, with a long stout horizontal rhizome; stems glabrous; leaves alternate or nearly opposite, the lower verticillate in whorls of 3–5, membranous, cordate-ovate, acuminate, often with slightly sinuate margins, glabrous above, with very short appressed hairs on the veins beneath, 6–15 cm long, 5.5–11 cm broad, 9–13-nerved, the marginal veins often bifurcate; petioles as long as or slightly shorter than blade, with short glandular hairs at base; staminate flowers scattered, solitary or in glomerules of 2 or 3, sessile; spikes axillary, mostly solitary, loosely branched or rarely simple; perianth of staminate flowers campanulate, green, the reflexed oblong segments as long as the tube; stamens inserted on the perianth tube, near its base; anthers oblong; capsule glabrous, chartaceous, mostly emarginate at the top and often at base, 2.5–3.3 cm in diameter; seed wings very thinly membranaceous. Fl. May-July; fr. July-September. (Plate XXIX, Figure 6, a).

Woods and coppices. — Caucasus: W. Transc. Endemic. Described from vicinity of Novyi Afon. Type in Leningrad.

Note. The Caucasian dioscorea constitutes a disjunct enclave far removed to the north from the ancestral area, the nearest locations of the genus Dioscorea being, in one direction, Ethiopia and, in the other direction, Sikkim in the Himalayas. D. villosa, growing in the Atlantic part of North America, is thought to be most closely related to our species. The discovery in 1913 of the new species Dioscorea balcanica Košanin in the mountain forests of northern Albania proved that this group of dioscoreas had covered at one time a large area. The three northern species, together with one Korean species, 14 Himalayan, 3 Japanese, 5 Chinese, and 5 Himalayan species, compose Section 20 Macropoda Uline which is distinguished, among other characters, by the most primitive structure of inflorescences, fruits, and flowers within the entire genus. D. caucasica is not related to the African species.

Subgenus II. **EUDIOSCOREA** Pax. in Engl. et Prantl. Pflzfam. II, 5 (1888) 134. — Wing of seeds membranous, uniformly surrounding the seed on all sides.

★ D. batatas Decne. Rev. Hortic. ser. 4, III (1854) 243, VI (1855) 69; Knuth Monogr. in Pflzr. IV, 43 (1924) 261. — Ic.: l. c., Figure 55.

Perennial, glabrous, producing underground tubers; stems angled, vigorous, purple-striped; leaves alternate, opposite, or ternate; leaf blades 6–10 cm long and broad, more or less 3-lobed, the lateral lobes rounded, the middle lobe acuminate; staminate inflorescences simple spikes; flowers 2 mm in diameter. (Plate XXIX, Figure 7, a).

General distribution: China, Japan. Described from China. Type in Paris.

497 Note. Cultivated as a vegetable in Manchuria and China, as well as in southern Africa, for its edible tubers. Introduction into the USSR seems feasible.

Subgenus III. **STENOPHORA** (Uline) Knuth; Uline in Engler et Prantl. Pflzfam. Nachtr. zu II, 5 (1897) 84 (pro sectio); Knuth Monogr. in Pflzr. IV, 43 (1924) 313. — Wing of seeds introrse.

2. D. polystachya Turcz. in Bull. Soc, Nat. Moscou VII (1837) 158. — D. Giraldii Knuth in Pflzr. IV, 3 (1924) 315. — D. quinqueloba Maxim. Prim. Fl. Amur. (1859) 277 (non Thunb.); Kom., A.H.P. XX, 487. — Ic.: Kom. and Alis., Opred. rast. Dal'nevost. Kr. 1, Plate 119; Knuth l. c. Figure 60.

Perennial; with a stout horizontal rhizome; stems glabrous, vigorous; leaves alternate; leaf blades thickly membranous, broadly cordate, 6–10 (-14) cm long, 4.5–8.5 (-13) cm broad, glabrate above with scattered short white hairs, covered on the veins beneath with short appressed hairs, 7-lobed, mostly 9-nerved, the inner veins bifurcate, the lateral lobes obtuse or rounded, the longer central lobe elongate acuminate, or rarely the blade merely emarginate or emarginate-lobate, the slender petiole mostly as long as the blade; staminate flowers short-pediceled, in cymules of 3–7 or rarely solitary, forming simple or rarely branched solitary axillary racemes; perianth segments oblong or oval, slightly shorter than the tube; stamens inserted on the upper part of the perianth tube; anthers oblong-ovaloid; capsules more or less emarginate at the top, sessile or borne on very short stipes, 1.6–2.5 cm long, 1.3–2 cm broad; wing of seeds long, thinly membranous. Fl. June-August; fr. July-September. (Plate (Plate XXIX, Figure 8, a).

Woods margins and coppices; also thin broad-leaved and mixed woods. — Far East: Ze.-Bu., Uss. Gen. distr.: Jap.-Ch. Described from Peking. Type in Tokyo?

Note. While the northern limit of dioscorea in Europe lies at 43° N. lat., the Far Eastern dioscorea in the Bureya River estuary reaches 49° N. lat. The affiliation of this species (57th section Eustenophora Knuth) is excusively East Asian, and comprises 7 species of which 4 grow in Japan, one in Indochina, and the rest in China.

Genus 305. **TAMUS** * L.

L. Gen. ed. I (1737) 305.– L. Sp. pl. ed. 1 (1753) 1028.

Perianth of staminate flowers urceolate-campanulate, deeply 6-parted, the segments subequal; stamens inserted at the bottom of the perianth;
498 anthers minute, ovaloid; style rudimentary, tubercle-shaped or shortly 3-parted; perianth of pistillate flowers with 6 minute narrow segments; staminodes minute or absent, ovary 3-celled, with 2 ovules in each cell; berry globose, fleshy-succulent, indehiscent; underground part tuberous; leaves alternate, cordate, entire or nearly 3-lobed; flowers pedicellate; staminate flowers solitary or in few-flowered cymules, forming axillary racemes; pistillate flowers in simple racemes.

1. T. **communis** L. Sp. ed. 1 (1753) 1028; Knuth, Monogr, in Pfzr. IV, 43 (1924) 341–342.— Ic.: Baxter. Brit. phaen. Bot. IV (1840) tab. 391; Lam. III (1791) tab. 817; Knuth Monogr. Figure 20.— Georgian dzaglis-satekhela, dzagli satatsuri, shelavi urdzeni; Armenian lashtak vairi; Lezghian dzyrkhuchu; Chechen tsytskin tuelysh.

Perennial; leaves deeply cordate, mostly entire, membranous, long-petioled, 8–14 (-20) cm long, 4.5–11 (-16) cm broad; staminate racemes mostly longer than peduncle, simple or branched; flowers mostly in cymules; pedicels slightly shorter than flowers; perianth urceolate-infundibular, yellowish, white, 3–6 mm in diameter; stamens exserted from perianth tube; rudimentary styles 3, subulate, distinct down to base or united at base; pistillate racemes abbreviated, much shorter than peduncle, few-flowered; pistillate flowers pedicellate, with urceolate-campanulate perianth; stamens 6, more or less rudimentary; stylar column 3-angled, the length of perianth segments. Fl. April-June; fr. (June) July-September.

Woods or rarely coppices.— European part: Crimea; Caucasus: all regions except the high-mountain part. Gen. distr.: Atl. Eur., W. and E. Med., Bal.-As. Min., Arm.-Kurd., Iran., Centr. Eur. (rare). Described from S. Europe. Type in London,

Note. Berries poisonous, with deadly effect on children. Young shoots are used as a substitute for asparagus. The root has diuretic, emetic, and laxative properties. A powder made from the roots is used for dressing wounds (Rollov, Dikor. r. Kavkaza, 1908, 497). An ornamental plant, suitable for pergolas and hedges.

Family XXXVI. **IRIDACEAE** * LINDL.

Lind. Nat. Syst. ed. 2 (1836) 332.

Perennials with creeping or bulbous rootstock, rarely subshrubs (none in the USSR); leaves ensiform or rarely linear, erect; inflorescence terminal, 1-flowered or spicate or paniculate; flowers bisexual, actinomorphic or zygomorphic; perianth corolline, with a more or less
499 elongated tube, the segments equal or the inner differing from the outer; stamens 3, distinct or connate; ovary inferior, 3-celled, with numerous ovules in each cell and central placentation, or rarely ovary 1-celled with

* Adopted from the Roman writer Pliny.

** Arranged by B.A. Fedchenko, except for the section Juno of the genus Iris and the genus Gladiolus.

parietal placentation; upper part of style 3-cleft, the style-branches more or less petaloid; fruit an oblong or spherical many-seeded dehiscent capsule; seeds globose or angular due to mutual pressure during growth, the testa thin or thickened; embryo small in horny or fleshy endosperm.

Iridaceae contain about 60 species distribution chiefly through the tropics and subtropics. The Cape Province in South Africa and tropical America are particularly rich in plants of this family. In Europe there are 7 genera and 105 species or groups of species.

Key to Genera

1. Flowers actinomorphic . . . . . 2.
+ Flowers zygomorphic, slightly bilabiate, in 1-sided spicate inflorescence. . . . . 309. **Gladiolus** L.
2. Aerial stem absent; terminal flower solitary; axillary flowers several, each spathe containing only one flower; perianth segments equal; perianth tube elongated and surrounded by leaf bases; ovary at or below soil surface; leaves linear or filiform; style branches funnelform or more or less fimbriate . . . . . 306. **Crocus** L.
+ Aerial stem mostly leafy, each spathe enclosing 2 or more flowers; the two whorls of perianth segments unequal . . . . . 3.
3. Style branches petaloid, covering the anthers . . . . . 307. **Iris** L.
+ Perianth segments undifferentiated, mostly rounded, alternating with stamens . . . . . 4.
4. Stamens distinct; style branches slightly dilated in upper part; stem leafy; leaves ensiform; seeds the size of peas . . 308. **Belamcanda** Adans
+ Filaments of stamens united into a tube; style branches narrow; leaves elongated, long-pointed, almost subulate-tipped; seeds smaller. . . . . *Sisyrinchium L.

Genus 306. **CROCUS*** L.

L. Gen. pl. (1735).

Perennial; corm covered with membranous or fibrous tunics, giving rise to a tuft of fibrous roots; stem none; flowers solitary or several, apparently
500 arising directly from the corm, being enclosed in membranous scales; green leaves developing after or rarely together with flowers; scape enclosed at base by a membranous spathe or basal spathe absent; floral spathe borne about the middle of the scape; flowers long-funnelform, the narrowly cylindric tube enlarged at throat, the limb of 6 segments; stamens inserted at throat, shorter than perianth; anthers erect, linear, commonly longer than filaments; ovary oblong, 3-celled, the cells many-ovuled; style filiform, with 3 stigmas. Nearly all crocus species have beautiful flowers and deserve to be grown in gardens. Information concerning species of technological importance (as a source of saffron) is given in connection with individual species.

* Name occurring in the writings of ancient authors.

1. Flowers appearing in spring. . . . . 2.
+ Flowers appearing in fall. . . . . 11.
2. Tunics of corm forming a fibrous network . . . . . 3.
+ Tunics of corm not reticulate . . . . . 5.
3. Flowers yellow . . . . . 9. **C. susianus** Ker.
+ Flowers white or lilac. . . . . 4.
4. Fibers of corm tunics slender; flower solitary . . . . . 6. **C. Heuffelianus** Herbert.
+ Fibers of corm tunics coarse; flowers in 2's or 3's . . . . . 8. **C. variegatus** Hoppe et Hornsch.
5. Flowers yellow . . . . . 6.
+ Flowers white or violet . . . . . 7.
6. Leaves ciliolate, narrow-keeled; stigmas considerably overtopped by anthers . . . . . 12. **C. aureus** Sibth. et Sm.
+ Leaves glabrous, broad-keeled; stigmas slightly overtopped by or at one level with anthers . . . . . 13. **C. Korolkowi** Rgl. et Maw.
7. Tunics at base of corm separating into a ring (C. biflorus Mill. group) . . . . . 8.
+ Tunics at base of corm not separating into a ring; flowers lilac . . . . . 14. **C. Michelsoni** B. Fedtsch.
++ Tunics at base of corm not separating into a ring; flowers whitish. . . . . 10. **C. alatavicus** Rgl. et Sem.
8. Flowers white, suffused with purple; outer leaves with 3 conspicuous violet nerves . . . . . 15. **C. tauricus** Trautv.
+ Flowers bluish-violet; sometimes with darker stripes . . . . . 9.
9. Outer perianth segments elliptic-lanceolate, subobtuse; inner segments shorter, round-tipped . . . . . 17. **C. artvinensis** (Philipp.) Grossh.
+ All perianth segments oblong-lanceolate, acutish . . . . . 10.
10. Flowers golden-yellow at throat . . . . . 16. **C. Adami** J. Gay.
+ Flowers pale, not yellow, at throat . . . . . 18. **C. Roopiae** Woron.
501
11. Flowers violet . . . . . 12.
+ Flowers white or yellow . . . . . 13.
12. Leaves ca. 1 mm broad . . . . . 5. **C. Autrani** Alb.
+ Leaves up to 3 mm broad . . . . . 19. **C. speciosus** MB.
13. Flowers yellow or orange; leaves of the preceding year usually persistent till flowering . . . . . 4. **C. Scharojani** Rupr.
+ Flowers lilac, white or stramineous, sometimes reddish- or yellowish-tinged; leaves replaced each year . . . . . 14.
14. Leaves and flowers appearing together . . . . . 15.
+ Leaves appearing in spring and withering before flowering . . . . . 16.
15. Stigmas much longer than style . . . . . 7. **C. Pallasii** MB.
+ Stigmas much shorter than style . . . . . 11. **C. caspicus** Fisch. et Mey.
16. Flowers 2–3 cm long . . . . . 3. **C. karsianus** Fom.
+ Flowers 4.5–6 cm long. . . . . 17.
17. Flowers ca. 6 cm long, the throat bearded . . . 1. **C. vallicola** Herbert.
+ Flowers ca. 4.5–5 cm long, the throat naked . . . . . 2. **C. Suvorovianus** C. Koch.

Subgenus I. **INVOLUCRATI** Maw. — A basal spathe present in addition to a 2-leaved floral spathe borne about the middle of the scape.

Section 1. FIBROEMEMBRANACEI Maw. — Corm tunics membranous-fibrous, the fibers not netted.

1. **C. vallicola** Herbert in Bot. Reg. XXXI, misc. p. 7. — Exs.: Pl. or. exs. No. 207. — Ic.: Bot. Reg. vol. XXXIII, tab. 16, Figure 3; Maw, Crocus, tab. 2.

Perennial; 6–12; corm depressed-globose, 1.3–2 cm in diameter, the outer tunic thin, fibrous; leaf sheaths shorter than spathe; perianth throat bearded, the segments pale milky, ca. 6 cm long, elliptic to lanceolate, acuminate and point-tipped, the inner face with purple stripes and 2 orange spots near the throat; anthers pale; style cleft to the level of anther tips; stigmas short, subentire to slightly denticulate-fimbriate, orange. — September. (Plate XXXI, Figure 3).

High mountain meadows. — Caucasus: Cisc. (near Mamişonskii Pass), W. and S. Transc. Gen. distr.: Bal.-As. Min. Described from Trebizond [Trabzon] Mountains, near Stavros. Type inknown.

2. **C. Suworowianus** C. Koch. in Linnaea XXI, 633. — C. vallicola Herb. var. Suworowianus Maw, Crocus, 80, tab. 2. Fig. 3, 8, 12, 15. —
502 C. vallicola var. Zohrabii Maw, Gard. Chron. new series, vol. XVI, 148. — Exs.: C. Koch. No. 915.

Perennial, 5–12; corm depressed-globose, 1.2 cm in diameter, the outer tunic finely fibrous; sheath exceeded by the spathe; perianth white, 4.5–5 cm long; perianth segments elliptic-lanceolate, obtuse to acutish, not point-tipped, the throat naked; style cleft to the level of anther tips; stigmas yellowish-orange, fimbriate-denticulate at the tips. September-October.

High mountain meadows. — Caucasus: W. Transc., sources of Rion, South Ossetia. Gen. distr.: Bal.-As. Min. Described from Pontic Range. Type in Berlin; cotype in Leningrad.

3. **C. karsianus** Fom. in Fomin. and Voronov, Opred. rast. Kavk. i Kryma, Vol. I (1907) 292.

Perennial, 5–8; corm tunics thin, membranous, separating into fibers; leaves appearing in spring and withering about flowering time, throat of perianth naked; perianth segments to 3 cm long, white, with slender nerves and 2 yellow spots at base; stigmas orange, pectinate-ciliate at tips. September.

Growing in adjoining Turkey and likely to occur in USSR in S. Transc. Described from former Ol'ta District. Type in Tiflis.

4. **C. Scharojani** Rupr. in Gartenfl., vol. XVII, 134, 135. — Exs.: HFR No. 640 and No. 32 (var. flavus Lipsky). — Ic.: Gartenfl. XVII, tab. 578, Figure 2a, b. c; Maw, Crocus.

Perennial; 10–25; corm small, globose, ca. 1.3 cm in diameter, the outer tunic thin fibrous-membranous; leaf sheaths exceeded by the spathe; leaves glabrous, ca. 1.3 cm broad, sometimes retained until the following;

flowering season; perianth bright yellow, unstriped, less often yellow (var. flavus Lipsky), the throat beardless; anthers pale yellow, overtopping the stigmas; style cleft to the level of stigma bases; stigmas entire, orange. September.

High mountain meadows. — Caucasus: Cisc., W Transc. Described from Mount Oshten and upper Ingur River. Type in Leningrad.

5. C. **Autrani** Alb. in Bull. Herb. Boiss. I (1893) p. 242, tab. IX.

Perennial, 10–20; corm rather small, globose; outer corm tunic membranous, separating into fibers at the top; leaves scarcely developed at flowering time, glabrous; throat of perianth white or pale lilac; perianth segments bright violet, acute; anthers whitish or sulfureous, as long as the white anthers; style overtopping the anther tips, the style branches linear; stigmas bright orange, short-branched, fimbriate. October.

503 Mountain meadows and limestone ranges. — Caucasus: W. Transc. Described from Abkhazia, from Chisshir. Type in Geneva; cotype in Leningrad.

Note. This plant ought to be introduced into cultivation for its flowers.

Section 2. **RETICULATI** Maw. — Fibers of the corm tunics netted.

6. C. **Heuffelianus** Herbert, Hist. Crocus, No. 25, p. 27 ex Journ. Hort. Soc. London II (1847) p. 273. — S. banaticus Heuff. in Flora XVIII (1836) 255. — Exs.: Heuf. Banat. 37; Wierzb. Banat. 2011; Dorfl. Herb. norm. 5183; Schultz Herb. norm. 2589. — Ic.: Rchb. Ic. fl. Germ. IX, tab. 361, Figures 800, 801; Maw. Crocus, t. 24.

Perennial, 25–35; corm rather small, subglobose, 13–15 mm in diameter, the tunics fibers rather slender; leaves scarcely exserted from their sheaths at flowering, developing later on, mostly pubescent, 0.7–1 cm broad, narrow-keeled, sometimes subrevoluate; spathe 1-leaved; flowers commonly solitary; perianth tube purple; throat purple, beardless; perianth segments purple, commonly with a dark spot near apex, the pale inner segments obtuse or emarginate; anthers orange, slightly longer than the glabrous white filaments; style cleft to the level of anther tips; stigmas orange, fringed with crowded divisions; seeds globose. March-April. (Plate XXXI, Figure 5).

Woods and coppices. — European part: M. Dnp.: vicinity of Kamenets-Podol'sk. Gen. distr.: Centr. Eur.; Bal.-As. Min. Described from Banat. Cotype in Leningrad.

7. C. **Pallasii** Goldb. Monogr. gen. Croci, Mém. Soc. Nat. Moscou (1817) 157; M.B. Fl. Taur.-Cauc. III (1819) 35 — C. autumnalis Pall. Ind taur. M.B. Fl. cauc. I (1808) 127. — C. sativus var. Pallasii Maw, Synops. Crocus in Gard. Chron. new ser. vol. XVI, p. 430. — Ic.: Rchb., Ic. fl. Germ. IX, tab. 360, fig. 796–7; Maw, Crocus tab. 29, d. — Exs.: HFR No. 589.

Perennial, 8–16; corm flat-based, 2–3 cm in diameter; outer tunic thin, netted-fibrous, produced at the top; leaves narrowly linear, 0.3–0.4 cm broad, the height of flower at anthesis, elongating in spring, the margin and keel ciliate; spathe 2-leaved; throat of perianth yellow, bearded;

perianth segments elongate, bright lilac, purple at throat, purple-striped; anthers orange, longer than the white or lilac filaments; style cleft to base of anthers; stigmas yellow, pendulous, bright orange, slightly ciliate, shorter than or sometimes as long as anthers. September-November. (Plate XXXI, Figure 2).

504 Stony slopes of hills and wood margins, on Yaila, in wormwood steppes nearly to the limit of solonchak vegetation. — European part: Crimea. **Gen. distr.**: Med., Bal.-As. Min.

Note. This species is very closely related to the extensively cultivated C. sativus L. and, as it is endowed with all its properties, it may be used for medicinal and economic purposes. According to the opinion of specialists, collecting stigmas of this species from wild growing plants may not be expedient, but the species is perfectly suited for cultivation. Prof. V. A. Tikhomirov maintains that it equals the best varieties of Crocus sativus and, as it has a lower mineral content (4.8% as against 7–8% in Crocus sativus), it is actually superior.

Subgenus **NUDIFLORI** Maw. — Basal spathe absent.

Section 3. **RETICULATISSIMI** B. Fedtsch. — Fibers of corm coat netted.

8. **C. variegatus** Hoppe et Hornsch., Tagebuch (1818) 187. — C. reticulatus Stev. ex Adam in Weber et Mohr. Beitr. zur Naturk. I (1805) 45. — C. reticulatus var. M. B. Fl. taur. cauc. I (1808) 28. — Exs.: Tommasini No. 2010 (topotype); Fl. austro-hung. No. 3477; HFR No. 2045. — Ic.: Maw, Crocus, tab. 35.

Perennial, 8–30; corm globose, ca. 1.3 cm in diameter; corm tunics composed of rather thick fibers, these netted and produced at the top; fibers of an additional, apparently inner, coat at the corm base, firm, united at base; leaves ca. 1.5 mm broad, strongly elongating after anthesis; leaf sheaths shorter than spathe; throat of perianth naked; perianth segments acute, white or bright lilac, the outer segments purple-striped on the outside; anthers orange, twice the length of the orange filaments; style cleft to the middle of anthers; stigmas subentire, orange, overtopping the anthers. March-April. (Plate XXXI, Figure 10).

Virgin soils, open glades, and oak woods. — European part: M. Dnp., Bl., L. Don; Caucasus: Cisc., W. Transc. (Novorossiisk). **Gen. distr.**: Centr. Eur., Bal.-As. Min. Described from Lipizza forest near Trieste. Cotype in Leningrad.

9. **C. susianus** Ker. in Bot. Mag. tab. 652; M. B. Cent. pl. ross. tab. 1. — C. reticulatus var. MB. Fl. taur.-cauc. I (1808) p. 28. — C. reticulatus var. aureus Trautv. in Bull. phys. math. Acad. Petersb. XVII, p. 329. — C. Roegnerianus C. Koch in Linnaea, Vol. XXI, p. 633. — Ic.: Bot. Mag. t. 652; Maw, Crocus, tab. 36.

Perennial, 10–30; corm globose, tunic fibers firm, netted, produced
505 at the top into distinct cusps; inner basal tunic consisting of a firm cartilaginous disk surrounded by radiating cusps; leaves the length of flowers, the margin and keel ciliate; throat of perianth naked; perianth

segments tapering, orange; outer segments brown-striped, rarely plain or brown throughout; anthers orange, twice the length of the orange filaments; style cleft to anther bases; stigmas long, entire, orange, greatly exceeding the anthers. February-March.

Coppices, exposed slopes, and juniper woods. — European part: Crimea. **Gen. distr.**: also reported for Bal.-As. Min. (Thrace). Described from Crimea.

Section 4. **FIBROMEMBRANACEI** Maw. — Corm tunic fibro-membranous, the fibers not netted.

10. **C. alatavicus** Rgl. et Semen. in Bull. Soc. Nat. de Moscou 1868 2, 434, No. 1730. — Ic.: Gartenfl. 1877 tab. 906; Maw, Crocus, tab. 45.

Perennial, 10–30; corm rounded-globose; tunics fibers parallel, joined by a thin membrane; leaves 6–9; ca. 1.5 mm broad, the keel two-thirds the breadth of blade, the margin and keel ciliate; throat of perianth yellowish, beardless; perianth segments slightly attenuate toward apex, whitish, the outer segments suffused on the outside with dingy purple or pale yellowish-brown or rarely pure white (var. albus Rgl.); anthers orange, longer than the orange filaments; stigmas orange, entire, commonly overtopped by the anthers. — April-May.

Mountain meadows. — Centr. Asia: Dzung., T. Sh., Syr D. Endemic. Described from Aral-Dzhel in Dzungarian Ala Tau. Type in Leningrad.

11. **C. caspicus** Fisch. et Mey. in Hohen. Enum. pl. Talysch. p. 22. — Ic.: Maw, Crocus, tab. 46. — Exs.: Hohenacker No. 2598.

Perennial, 10–30; corm ovoid; corm tunics membranous, brown, fibrous at base; inner basal tunic consisting of short radially spreading fibers; leaves 4 or 5, glabrous, ca. 1.5 mm broad; throat of perianth orange, beardless; perianth segments white, suffused with yellow at throat, attenuate toward apex; anthers yellow, twice as long as filaments; style cleft, greatly overtopping the anthers; stigmas very narrow, pendulous, entire. October-November.

Caucasus: Tal. **Gen. distr.**: Arm.-Kurd., Iran. Described from Talysh. Type in Leningrad.

12. **C. aureus** Sibth. et Sm. Prodr. fl. Graec. vol. I, p. 24. — Ic.: Sibth. et Sm. Fl. Graeca, tab. 35; Maw, Crocus, tab. 55.

506 Perennial, 15–30; corm oblong-globose; corm tunics membranous, the longitudinal fibers united but separating at the top; leaves ca. 4.2 mm broad, the margin ciliolate, the dorsal keel narrow; perianth bright orange, the throat naked; perianth segments attenuate toward apex, the somewhat longer outer segments sometimes gray-striped on the outside; anthers pointed at base, divergent at tips, twice the length of the yellow filaments; style yellow, cleft to middle of anther level; stigmas yellow, rarely orange, obscurely dissected.

European part: Crimea (possibly an escape from cultivation). **Gen. distr.**: Centr. Eur., Bal.-As. Min. Described from Greece.

13. C. Korolkowi Rgl. et Maw, Maw in Gard. Chron. new ser., vol. XIII, p. 531 (apr. 24, 1880). — Exs.: Fedtsch. Fl. turkest. exs.: No. 58; H. F. A. M. No. 68. — Ic.: Maw, Crocus, tab. 55.

Perennial, 10–20; corm oblong-globose; fibers of the membranous corm tunics slender, parallel, somewhat intertwined and obscurely netted; leaves 8–12, at anthesis about reaching the perianth tubes, later considerably elongating, ca. 2 mm broad, the concave keel but slightly narrower than the blade; throat of perianth naked; perianth segments yellowish-orange, the somewhat longer outer segments brownish-tinged on the outside; anthers orange, not divergent at tips; style cleft to middle of anther level; stigmas orange, entire, shorter than to as long as anthers. March. (Plate XXXI, Figures 6, 9).

Centr. Asia: Syr D. and Amu D. Endemic. Described from the foothills between Tashkent and mountains of Karak-ata. Type in Leningrad.

14. C. Michelsoni B. Fedtsch. sp. nova in Addenda, III, p. 749. —

Perennial, 10–25; corm oblong, ca. 20–25 mm in diameter; tunics membranous, separating into longitudinal fibers, brownish-tawny, produced at the top and enclosing the stem base; vaginate leaves 4 or 5, white-membranous, enveloping the stem and the green leaves, these emerging
509 at anthesis; leaves at fruiting time up to 30 cm long, ca. 2 mm broad, glabrous, the midrib broad; basal spathe leaf absent; floral sheath 2-leaved; perianth tube ca. 7.5 cm long, the throat naked; perianth segments lanceolate, the inner slightly shorter than the outer; stamens about as long as style, the yellowish filaments slightly longer than the orange stigmas; style shortly parted at apex into 3 subentire stigmas; capsule ovoid-oblong. March.

Stony slopes of the high mountain zone of the Kopet Dagh. — Centr. Asia: Mtn. Turkm., Kopet Dagh, Aidere Ravine and vicinity of Kheirabad meteorological station. Endemic. Described from Kheirabad. Type in Leningrad.

Note. One of the most beautiful crocus species. Being a plant of high mountains, it is likely to be hardy in northern regions.

Section 5. ANNULATI Maw. — Basal tunic discoid, radiating into 2 or 3 spines.

15. C. tauricus (Trautv.) Puring in A. H. Jur. 1 (1900) 194. — C. biflorus var. tauricus Bull. phys.-math. Acad. Pétersb. XVII (1859) 329. — Exs.: Callier. Iter taur. tert. No. 740 (C. Adami).

Perennial, 8–22; corm depressed-globose; tunic firmly coriaceous; basal tunic disk-shaped, radiating into 2 or 3 spines, these strongly ciliate-toothed on the margin; leaves glabrous, appearing with flowers, ca. 2 mm broad; throat at perianth bearded; perianth segments yellowish-white to violet, the outer segments with dark violet stripes on the outside; anthers orange; style deeply cleft; stigmas entire, orange. March.

Glades, stony slopes, also on Yaila. — European part: Crimea; Caucasus: W. Transc. (Novorossiisk). Endemic. Described from the Crimea. Type in Leningrad.

Plate XXXI

1. Crocus speciosus M.B. 4) stigmas, 7) fruiting plant, 8) bulb with base.— 2. C. Pallasii M.B., stigmas.— 3. C. vallicola Herb., stigmas.— 5. C. Heuffelianus Herb., stem.— 6. C. Korolkovii Rgl. et Maw., 9) bulbs.— 10. C. variegatus Hoppe, bulb and enlarged fragment of outer tunic.— 11. Iris uniflora Pall, fruit.— 12. I. tianschanica (Maxim.) Vved., fruit.— 13. I. sibirica L., fruit.— 14. I. orientalis Thunb., fruit.— 15. I. ensata Thunb., fruit.— 16. Belamcanda chinensis Leman.

16. C. Adami Gay in Ferus. Bull. Soc. Nat. vol. XXV (1831) 319 (219). — C. biflorus var. Adami Baker Rev. Croc. in Gard. Chron. new. ser. (1879) 434. — C. biflorus, M. B. Fl. taur.-cauc. III (1819) 37. — Ic.: Maw, Crocus, tab. 59-b, Figure 2. — Exs.: Pl. or. exs. No. 204-205.

Perennial, 5-20; corm depressed-globose; tunics firmly coriaceous; basal tunic disk-shaped, the 2 or 3 marginal spines without ciliate teeth; leaves glabrous, appearing together with flowers, ca. 2 mm broad; throat of perianth yellow, bearded; perianth segments lilac, acutish, sometimes not more than 2.5 cm long (var. Fomini Woron.); the outer segments sometimes with 3-5 purple stripes on the outside; anthers orange, longer than the verrucose orange filaments; style cleft to middle of anther level; stigmas entire, orange, slightly longer than anthers. March.

Coppices and grassland, rarely in solonchak soils. — Caucasus: Dag., S. Transc. Gen. distr.: Iran. Described from the vicinity of Tiflis. Type in Leningrad.

510 17. **C. artivensis** (I. Phil.) Grossh. in Fl. Kavk. I (1928) 248. — C. biflorus var. artvinensis I. Phil. in Mokrzhetskii, V. A. Tikhomirov and Yu. A. Filippov, Kul'tura shafrana v Krymu in na Kavkaze (Crocus Cultivation in the Crimea and the Caucasus) (1917) 46. — Ic.: Filippov, l. c.

Perennial, 5-10; corm depressed-globose; tunic thinly coriaceous; basal tunic disk-shaped, the peripheral spines toothless; leaves glabrous, ca. 2 mm broad; throat of perianth bearded; perianth segments bluish-violet, with pinnate blackish-violet stripes; other segments elliptic-lanceolate, obtusish; inner segments much shorter, obtusely rounded at apex. May.

Rocks and ravines. — Caucasus: W. S. Transc. Endemic. Described from former Artvin District. Type in Tiflis.

18. **C. Roopiae** Woron., Not. Syst. ex Herb. H. B. P. V (1924) 62; Grossgeim, Fl. Kavk. I (1928) 248.

Perennial, 10; corm depressed-globose; tunics firmly coriaceous; basal tunic disk-shaped, with 2 or 3 peripheral rings; leaves appearing with flowers, ca. 2 mm broad; throat of perianth bearded, pale, not yellow-tinged; perianth segments violet, without stripes or obscurely striped; stigmas orange, their lobes thickened at tips. April.

Caucasus: W. Transc. (in former Kars Region). Endemic. Described from former Kars Region. Type in Tiflis.

19. **C. speciosus** M. B. Fl. taur.-cauc. I (1808) 27. — Ic.: M. B. Cent. pl. Ross. tab. 71; Maw, Crocus, tab. 64; Gartenfl., tab. 379. — Exs.: Pl. or. exs. No. 206.

Perennial, 10-40; corm rather large, globose or depressed-globose, bearing adventitious cormlets at base; tunics membranous, thinner than in other crocus species, separating into rings; basal tunic membranous, consisting of 1 or 2 rings; leaves 2-4, appearing after flowers and greatly increasing in size by following season and then up to 40 cm long, 6-8 mm broad, the blade revolute, the margins and midrib ciliate; throat of perianth white, naked; perianth segments acuminate, lilac, the 3 longitudinal purple

stripes reticulately branched; outer segments purple-based outside; style cleft to the level of anther tips; stigmas lobate, orange, greatly exceeding the anthers, sometimes recurved. September-October. (Plate XXXI, Figures 1, 4, 7, 8).

European part: Crimea; Caucasus: W.S. and E. Transc. Gen. distr.: Bal.-As. Min., Arm.-Kurd., Iran. Described from the Crimea and E. Caucasus. Type in Leningrad.

511 Note. Prof. Tikhomirov studied this species with a view to extracting saffron from its stigmas to replace the imported product obtained from C. sativus. The results of his studies have shown that perfectly satisfactory saffron can be secured from C. speciosus.

Genus 307. IRIS* L.

L. Sp. pl. ed. I (1753) 38.

Herbaceous perennials, usually with an underground rhizome, rarely a tuber or a bulb; rhizome thickened, horizontal or creeping, rarely slender and long-creeping, sometimes very short; stems solitary or tufted, simple or branched; sometimes enlarged at base into a tunicated tuber or a bulb enveloped in fibrous coats; leaves mostly basal, flat, ensiform, 2-ranked, sometimes linear or filiform; cauline leaves few or flowers borne on a leafless scape; flowers solitary or in a few-flowered inflorescence; pedicels rather long; inflorescence subtended by a 1–3 valved spathe, the valves elongate acuminate, sometimes inflated; flowers actinomorphic, usually large, 6-parted, with a rather long tube, this sometimes persistent in fruit as a beak; perianth segments consisting of a narrow claw and a broader limb, the transition between the two parts gradual or abrupt; the 3 inner segments often differing conspicuously in shape and size from the outer segments, sometimes very small; stamens inserted at base of outer segments, the slender filaments commonly distinct; anthers linear, basifixed, extrorse; ovary 3-celled, with numerous ovules in each cell, oblong, attenuate upward or rounded at the top, sometimes beaked, often ribbed at angles; style rather short, 3-parted, the style branches petal-like in shape and color; each style branch [referred to in the Russian specific descriptions as style] with a 2-lobed tip [crest], the stigma situated on the lower side at the base of each lobe; fruit a 3-angled sometimes ribbed loculicidal many-seeded capsule; seeds flattened or subglobose, with membranous or coriaceous testa, sometimes conspicuously arillate.

Key to Sections

1. Bulbose plants . . . . . 2.
\+ Rhizomatous or tuberiferous plants . . . . . 4.
2. Outer bulb coats membranous . . . . . 3.
\+ Outer bulb coats reticulate (page 421) . . . . . Section Reticulatae
512 3. Roots cordlike or fusiform, lasting through the winter (page 424) . . . . . Section Juno

* Name used by Theophrastus.

+ Roots dying off before winter (page 421) . . . . . Section Xiphion
4. Tuberous plants, the tuber coats reticulate (page 423) . . . . . Section Gynandriris
+ Rhizomatous plants, the rhizome never covered with a reticulate coat. . . . . 5.
5. Outer perianth segments bearded with multicellular hairs . . . . . 6.
+ Outer perianth segments beardless, glabrous or sparsely hairy . . . . . 8.
6. Seeds with a conspicuous milk-white aril . . . . . 7.
+ Seeds without an aril (page 413) . . . . . Section Pogoniris
7. Stem 1-flowered (page 405) . . . . . Section Oncocyclus
+ Stem 2- or 3-flowered (page 411) . . . . . Section Regelia
8. Inflorescence a raceme; seeds conspicuously winged (page 404) . . . . . Section **Pardanthopsis**
+ Inflorescence not racemose; seeds wingless (page 391) . . . . . Section Apogon

1. Section APOGON Baker in Journ. Linn. Soc. London XVI (1877) 137.— Rhizomatous irises; outer perianth segments beardless. This section contains a number of well defined groups, each composed of between 2 and 10 closely related species, often only slightly differing from each other. The following groups may be distinguished: Group 1, I. unguicularis, represented in the USSR by the species I. lazica; Group 2, I. tenuifolia, represented in the USSR by 3 species: I. tenuifolia, I. tianchanica, I. ventricosa, and also joined by I. songarica; Group 3, I. ruthenica, also containing I. uniflora; ; Group 4, I. ensata, with one polymorphic species; Group 5, I. sibirica; containing 2 USSR species, I. sibirica and I. orientalis; Group 6, I. tripetala, represented in the USSR by only one species, I. setosa; Group 7, I. foetidissima, consisting merely of this species and apparently confined to the flora of the USSR; Group 8, I. laevigata, also including the closely related species I. Kaempferi and readily extendable to I. pseudacorus; Group 9, I. spuria, represented in the USSR by no less than 5 not easily distinguishable species (I. halophila, I. sogdiana, I. musulmanica, I. notha, I. violacea), also embracing the species I. graminea, I. humilis, I. Ludwigii, and I. songarica.

1. Perianth tube usually longer than the limb . . . . . 2.
+ Perianth tube about one-third as long as the limb . . . . . 8.
2. Leaves to 9 mm broad . . . . . 1. **I. lazica** Alboff.
+ Leaves not more than 2 mm broad . . . . . 3.
3. Rhizome slender, bearing 1 or few stems, not covered with vestiges of preceding year's leaves . . . . . 23. **I. Ludwigii** Maxim.
+ Plants densely cespitose; rhizome covered with vestiges of preceding year's leaf sheaths . . . . . 4.

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4. Spathe-valves inflated, reticulate due to transversal nerves . . . . . 4. **I. ventricosa** Pall.
+ Spathe-valves with longitudinal nerves only, not reticulate . . . . . 5.
5. Plants densely cespitose; flowers subradical, on very short peduncles. . . . . 6.
+ Plants not densely cespitose; peduncles well developed . . . . . 7.
6. Leaves 2–4 mm broad; mountainous plants. . . . . 3. **I. tianschanica** (Maxim.) Vved.

\+ Leaves 1–2 mm broad; arenarious plants of the desert region . . . . . 2. **I. tenuifolia** Pall.

7. Stem a leafless scape; flower mostly solitary . . . 22. **I. humilis** M. B.
\+ Stem more or less leafy; flowers 2–4 . . . . . 5. **I. songarica** Schrenk.

8. Flowers yellow . . . . . 9.
\+ Flowers azure, purple or violet, rarely whitish . . . . . 10.

9. Flowers bright yellow; inner perianth segments much smaller than style branches . . . . . 15. **I. pseudacorus** L.
\+ Flowers dingy yellow; inner perianth segments larger than style branches . . . . . 16. **I. halophila** Pall.

10. Stem flattened; perianth tube cup-shaped; seeds purple . . . . . 12. **I. foetidissima** L.
\+ Stem more or less terete; perianth tube commonly conical; seeds never purple . . . . . 11.

11. Capsule beaked . . . . . 12.
\+ Capsule beakless . . . . . 17.

12. Stem terete, up to 150 cm long; flowers blue or azure . . . . . 13.
\+ Stem 2-angled, up to 25 cm long; flowers whitish, the claws purple . . . . . 21. **I. graminea** L.

13. Beak of capsule short; limb of outer perianth segments gradually passing into the claw . . . . . 8. **I. ensata** Thumb.
\+ Beak of capsule long; limb of outer perianth segments sharply differentiated from the claw . . . . . 14.

14. Limb of outer segments two-thirds as long as the claw . . . . . 15.
\+ Limb of outer segments as long as the claw . . . . . 16.

15. Flowers violet; plants of Transcaucasia . . . . . 20. **I. violacea** Klatt.
514 \+ Flowers pale azure; plants of Central Asia . . . . 17. **I. sogdiana** Bge.

16. Flowers azure or pale azure tinged with yellow; spathe valves narrow . . . . . 18. **I. musulmanica** Fomin.
\+ Flowers azure; spathe valves broad . . . . . 19. **I. notha** M. B.

17. Inflorescence of 1 or 2 flowers . . . . . 18.
\+ Inflorescence many-flowered . . . . . 19.

18. Spathe valves acute, membranous, marcescent . . . . . 6. **I. ruthenica** Ker.-Gawl.
\+ Spathe valves obtuse, at length subchartaceous, not marcescent. . . . . 7. **I. uniflora** Pall.

19. Inner perianth segments about the same size as the outer . . . . . 20.
\+ Outer perianth segments several times the size of the inner . . . . . 11. **I. setosa** Pall.

20. Ovary 2–3 times as long as or rarely equaling the perianth tube. . . . 21.
\+ Ovary many times as long as the barely perceptible perianth tube. . . 22.

21. Stem exceeding the leaves; capsule twice as long as broad . . . . . 9. **I. sibirica** L.
\+ Stem not exceeding the leaves; capsule 3 times as long as broad . . . . . 10. **I. orientalis** Thunb.

22. Flowers blue; leaves with a distinct midrib . . 13. **I. laevigata** Fisch.
\+ Flowers purple; leaves without a distinct midrib . . . . . 14. **I. Kaempferi** Thunb.

1. **I. lazica** Alboff., Prodom. Fl. Colch. (1895) 232. — I. unguicularis Poir. Voy. Barb. II (1785) 86, var. lazica Dykes, Iris p. 54. —

I. cretensis Janka f. latifolia Lipsky in A.H.P. XIII (1894) 339. — Exs.: Pl. or. exs. No. 165.

Perennial, 30–50 cm tall; rhizome short, stout; stem leafless, sometimes up to 20–30 cm long; leaves all radical, 2-ranked, broadly linear, 20–30 cm long, 6–9 mm broad, firm, acuminate; pedicels 2–3 cm long, solitary or in pairs; spathe valves 2, lanceolate; flowers solitary; perianth tube greatly exceeding the ovary, 7–10 cm long, as long as or longer than the perianth segments; outer segments with ovate-spatule limb gradually passing into the claw, azure above, pale beneath, yellow-banded; inner segments resembling the outer; style branches pale purple with a golden bloom; style crests long, narrow, biparted at tips, toothed; stigmas
515 small, oblong; ovary oblong-cylindric, beakless; capsule rounded 3-angled; seeds small, globose or flattened, rugose. March. (Plate XXXII, Figure 2).

Wet stony places. — Caucasus: W. Transc.: Chorokh River. **Gen. distr.**: Asia Minor. Described from Abkhazia. Type in Geneva.

2. **I. tenuifolia** Pall., Reise durch versch. Prov. III No. 66 (1776) 714; Ldb. Fl. Ross. IV, 93; Shmal'g., Fl. II, 470; Kryl., Fl. Zap. Sib. III, 593; Dykes Iris p. 32. — I. acaulis Pall. Reise III, 213. — I. Regelii Maxim. ex Rgl. in A.H.P. VI (1879) 115. — Ic.: Pallas l.c. tab. C. fig. 2.

Perennial, 20–40 cm tall; rhizome creeping, slender, branching at top and forming dense tufts, covered with brownish fibrous vestiges of leaf sheaths; stem obsolescent or concealed by tufts of leaves, very short; basal leaves up to 40 cm long, to 1.5 mm broad, linear-filiform, revolute, the uppermost commonly subobtuse, the others acuminate; flowers 2, lilac or pale blue, fragrant; pedicels very short; perianth tube slender, filiform, to 8 cm long, half as long again to twice as long as perianth segments; outer segments beardless, the claw long and broad, the limb oblong, sometimes with a band of unicellular hairs; inner segments slightly shorter and narrower than the outer, style branches narrowly linear; style crests oblong, attenuate at tips; capsule ovaloid, rounded 3-angled, to 4 mm long, short-beaked; seeds turbinate, blackish-brown, the testa rugose. April-May. (Plate XXXII, Figure 4).

Sands in desert steppes and sandy river banks. — European part: L. V.; W. Siberia: U. Tob.; E. Siberia: Dau.; Centr. Asia: Ar.-Casp., Balkh. **Gen. distr.**: Mongolia, China. Described from Dauria (near Tareinor). Type in London.

3. **I. tianschanica** (Maxim.) Vved. in Fl. Turkm. I (1932) 377. — I. tenuifolia Pall. var. tianschanica Maxim. in Bull. Acad. Sc. Pétersb. XXVI (1880) 511.

Perennial, 25–40 cm tall; rhizome slender, branching at the top and forming dense tufts of matted shoots, these somewhat bulbous at base and densely covered with brown vestiges of old leaves; stem commonly very short, not exceeding 3–5 cm, concealed in the leaf bundles; basal leaves to 40 cm long, linear, erect, to 5 mm broad, long-acuminate, rigid; spathe valves long-acuminate, to 15 cm long; flowers 1 or 2, lilac or pale blue; pedicels very short; perianth tube very slender, ca. 10 cm long, much longer than perianth segments; outer segments beardless, narrowly spatulate, gradually passing into the claw, pale azure with darker veins,
516 the upper third reflexed; inner segments erect, slightly shorter than the

outer, the claw narrower compared with the preceding species; style branches short, the lanceolate crests falcate; capsule ovaloid, the rounded ribs to 3 cm long, the beak short. April-May. (Plate XXXI, Figure 12; Plate XXXII, Figure 5).

Stony mountain slopes. — Centr. Asia: Dzu.-Tarb.; T. Sh., Pam.-Al. Gen. distr.: Dzu.-Kash. Described from E. Tien Shan (Kometydavan Ravine and Se-chai River, Przheval'skii). Type in Leningrad.

4. I. **ventricosa** Pall. Reise durch versch. Prov. Russ. Reichs III (1776) 320; 712; Dykes Iris p. 34; Ldb. Fl. Ross. IV, 94; Turcz. Fl. Baic.-Dah. II, 2, 193. — Ic.: Pall. l.c. tab. 13, fig. 1; Dykes Iris p. 34.

Perennial, 20–35 cm tall; rhizome thickened, short; stems leafless, scapose, as long as the leaves, clustered above the rhizome, densely covered at base with brown fibrous vestiges of leaf sheaths; leaves all radical, linear, to 30 cm long and 6 mm broad, thickish; spathe valves large, inflated, netted-veined; pedicels short; perianth tube 2.5 cm long or slightly longer; outer perianth segments narrowly obovate, the limb scarcely one-quarter to one-third the length of the slightly dilated claw; inner segments lanceolate; style branches narrow, the crests long and narrow. June.

Stony slopes. — E. Siberia: Dau.; Far East: Uss. Gen. distr.: Mong., China. Described from the mountain zone of Dauria, between valleys of Urulunguya and Argun rivers. Type in London.

5. I. **songarica** Schrenk in Fisch. et Mey., Enum. pl. nov. I (1841) 3; Boiss. Fl. or. V, 126; Ldb. Fl. Ross. IV, 99; Dykes Iris, p. 71. — Ioniris songarica Klatt in Bot. Zeit. XXX (1872) 502. — Iris multiflora B. Zing. in Acta Hort. Bot. Jurj. II, 1 (1901) 163.

Perennial, 40–80 cm tall; rhizome slender, dark; vestiges of the preceding year's dense tufts of leaves separating into fibers, these obliquely superposed and giving the impression of a spiral ball; stem terete, firm, to 40 cm long; leaves to 10 cm long and 4–6 mm broad, firm, the longitudinal veins prominent; spathe valves tightly clasping the bud, pale green, the upper margin distinctly coriaceous, the tip lanceolate; peduncles 1–4, well developed, each bearing 2 or 3 flowers, rarely 3–5 (var. multiflora O. Ktze); pedicels ca. 1 cm long; perianth tube 4–6 cm long, outer segments elliptic, with a constriction between limb and claw; claw elongate-ovate, with reddish-purple spots on pale azure ground; limb azure
517 with pale margins; inner segments oblanceolate, with reddish-purple spots on white or faintly purple ground; style branches slightly narrower than than the claws of inner segments; style crests narrow, overlapping; stigmas 2-lobed, with 2 triangular teeth; filaments purple; anthers reddish; capsule oblong; seeds cylindric, dark brown, the test rugose. April-May.

Clayey desert steppes. — Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Kyz. K., Kara K., Syr D., Amu D. Gen. distr.: Arm.-Kurd., Iran., Dzu.-Kash., Jap.-Ch. Described from Balkh., near Ayaguz River. Type in Leningrad.

6. I. **ruthenica** Ker.-Gawl. in Bot. Magaz. (1808) tab. 1123; Ldb. Fl. Ross. IV, 94; Turcz. Fl. Baic.-Dah. II (2), 193; Kryl., Fl. Zap. Sib. III, 545; Dykes Iris p. 52. — I. caespitosa Pall. ex Link. in Spreng.,

Schrader und Link, Jahrb. I, 3 (1820) 72. — I. verna Pall. Reise III, p. 213, 250. — Ic.: Bot. Mag. (1808) t. 1123, (1811) t. 1393. — Exs.: HFR No. 291.

Perennial, 25–50 cm tall; rhizome ropy, creeping, branched, 2–3 cm thick; stem slender, to 12 cm long, with few vestiges of leaf sheaths at base; radical leaves exceeding the stem, green, not rigid; cauline leaves 3, confined to lower part of stem, small, amplexicaul; spathe valves elliptic-lanceolate, membranous, finally marcescent; flowers solitary, terminal, fragrant; perianth tube cylindric, campanulately enlarged upward, two-fifths the length of segments, 2–3 times as long as or rarely equaling the ovary; outer segments oblong, gradually tapering toward base, round-tipped and usually minutely emarginate, beardless, bluish-violet, darker at the tip, the middle part marked with violet nerves and spots on violet or whitish ground; inner segments linear-obcuneate, one-third to one-half as broad as or just slightly narrower than the outer segments, obtuse, emarginate, bluish-lilac; style branches pale lilac, broadly linear, the broadly ovate crest lobes round-tipped and crenate; stigmas squarely truncate, with a prominent tooth at the middle; capsule ovaloid to subglobose, obtusely 3-angled, beakless, ca. 15 mm long and 8 mm broad; seeds 3-angled, the aril adhering to edge of seed throughout its length. End of May-June, August (second bloom).

Blind creek and steppe meadows, meadow slopes, birch woods, and pine forests; in mountains sometimes ascending into alpine meadows in the southern part of the high-mountain zone. — W. Siberia: Ob., Irt., Alt.; E. Siberia: Yen., Ang.-Say.; Far East: Uss.; Centr. Asia: Balkh., Dzu.-
518 Tarb., T. Sh. **Gen. distr.**: Mong., Jap.-Ch. Described from a cultivated specimen. Type not preserved.

7. I. **uniflora** Pall. in Link, ap. Spreng., Schrader et Link Jahrb. I, 3 (1820) 71; Ldb. Fl. Ross. IV, 94; Turcz. Fl. Baic.-Dah. II, 2, 194. — I. ruthenica var. uniflora Baker, Handb. of Irid. (1892) 4. — I. ruthenica (pro parte) Dykes Iris p. 52.

Perennial, 20–50 cm tall; rhizome creeping, branched; stem slender, to 15 cm long; radical leaves green, not rigid, linear-lanceolate, acuminate, broader than in I. ruthenica, up to 10 mm broad; cauline leaves few, close to flowers; spathe valves shorter than in I. ruthenica, somewhat inflated and firm at anthesis, becoming papery before fruit ripening, yellowish or at tips violet, the upper margin coriaceous; flowers resembling those of the preceding species; capsule globose, 3-angled, the truncate top cuspidate, the square valves 12 mm long and broad, enclosed in the lustrous spathe valves; seeds subglobose, dull black, the testa puncticulate, the small aril merely one-quarter to one-third the length of seed. May. (Plate XXXI, Figure 11).

Deciduous woods, blind creeks, and stony mountain slopes. — E. Siberia: Dau.; Far East: Okh., Ze.-Bu., Uss. **Gen. distr.**: Mong. Described from Siberia. Type in Berlin.

8. **I. ensata** Thunb. in Trans. Linn. Soc. London II (1794) 328; Boiss. Fl. Or. V, 127; Dykes Iris, p. 85; Krylov, Fl. Zap. Sib. III, No. 544. — I. an spuria? Pall. Reise durch versch. Prov. III Append. p. 713, No. 65. — I. lactea Pall. ibid. No. 64? — I. biglumis Vahl. Enumer. II

(1806) 140; Ldb. Fl. Ross. IV, 95; Turcz. Fl. Baic.-Dah. II/2, 194.— I. oxypetala C.A.M. in Ind. pl. Mus. Acad. Petr. II (1834) 8 sec. Ldb. Fl. Ross. IV, 99.— I. Pallasii Fisch. in Trev. Ind. Sem. horti Vratisl. (1821).— I. fragrans Lindl. Bot. Reg. XXVI, tab. 1.— I. caricifolia Pall. ex Link in Spreng. Schrad., Link. Jahrb. I, 3 (1820) 72.— I. longispatha Fisch. in Bot. Mag. (1825) t. 2528.— Ic.: Pall. l.c., tab. C f. 1; Gartenflora (1880) t. 1011 (var. chinensis Maxim.); (1898) t. 1452 (var. pabularia Naudin); Bot. Mag. (1832) t. 2331.

Perennial, 25–40 cm tall; rhizome rather stout, to 10 mm in diameter, beset with ropy root fibers; stems to 35 cm long, sometimes very short, compressed, firm within; radical leaves in clusters, covered at base with rigid vestiges of leaf sheaths, thickish and rigid, grayish-green, linear, to 50 cm long, greatly exceeding the stems; spathe valves green, lanceolate, long-acuminate, the margins white hyaline; pedicels as long as or slightly longer than perianth; perianth tube persistent in fruit and forming the beak; segments many times the length of tube; outer segments
519 slightly reflexed, pale lilac or whitish, obtuse or acutish (var. chinensis Maxim.), the limb gradually narrowed into claw; inner segments but slightly shorter and narrower than the outer, bluish-lilac; style branches lilac; style crests oblong-ovate, attenuate or pointed; stigmas minutely triangular-lobate; capsule elongate-ovaloid, to 5 cm long, subhexagonal, the beak to 5 mm long. May-July. (Plate XXXI, Figure 15).

Dry sandy places around lakes, meadows, clay-solonetz places in steppes, and solonetz meadows.— W. Siberia: Irt., Alt.; E. Siberia: Ang.-Say., Dau.; Far East: Uss.; Centr. Asia: Balkh., Dzu.-Tarb., Syr D., T. Sh. Gen. distr.: Afghanistan, Mongolia, Himalayas, Tibet, Jap.-Ch. Described from Japan. Type in Uppsala.

Economic importance. The leaves of this iris species are of some forage value, this being of particular significance in view of the marked salt resistance (see Gartenflora 1898, 370). The abundance of structural fibers in the leaves enables exploitation of the plant for production of cordage and coarse cloth.

Note. This is to some extent a compound species, as it contains several forms that display morphological differences and have distinct distribution areas.

9. **I. sibirica** L. Sp. pl. ed. I (1753) 38; Ldb. Fl. Ross. IV, 96; Shmal'g., Fl. II, 468; Boiss. Fl. Or. V, 126; Dykes Iris p. 20; Turcz. Fl. Baic.-Dah. II, 2, 195; Kryl., Fl. Zap. Sib. No. 548.— Ic.: Bot. Mag. (1788) t. 57; Rchb. Ic. Fl. Germ. 768, t. CCCLI, Figure 768; Dykes Iris tab. 1-a.— Exs.: HFR No. 236.

Perennial, 70–110 cm tall; rhizome creeping or ascending, the upper part densely covered with brown leaf vestiges; stem erect, to 1 m long, hollow, branched in upper part; radical leaves commonly much shorter than stem, linear, green, not rigid, to 50–80 cm long and 4 mm broad; cauline leaves 3, small, amplexicaul at base; inflorescence terminal, of 2 or 3 flowers; pedicels unequal; spathe valves membranous, light brown, oblong-elliptic, to 4 cm long; perianth tube very short, subcampanulate; outer segments oblong-obovate, deflexed, dark blue, the limb narrowed at base into a pale blue claw; inner segments plain dark blue, about as long and broad as or slightly narrower than the outer

segments; style branches oblong, slightly narrowed toward base, less
520 bright in color; crests ovate, unevenly toothed; stigmas acutely triangular-spatulate; capsule oblong-ovaloid, about twice as long as broad, beakless. June. (Plate XXXI, Figure 13).

Inundated, wet and forest meadows, birch woods, forest margins. — European part: all regions except Kar.-Lap., Crimea and L. V.; Caucasus: Cisc., Dag., E. and S. Transc.; W. Siberia: all regions; E. Siberia: Ang.-Say. Gen. distr.: Centr. Eur., Bal.-As. Min. Described from Austria, Switzerland and Siberia. Type in London.

10. **I. orientalis** Thunb. in Trans. Linn. Soc. London, II (1794) 328; Dykes Iris. p. 23. — I. sibirica var. sanguinea Ker.-Gawl. in Bot. Mag. t. 1604. — I. Nertschinskia Lodd. Bot. Cab. t. 1845 (1832-33). — I. haematophylla Fisch. in Ind. II sem. h. Petrop. (1823) 401; Sweet. Brit. Fl. gard. (1825) t. 118. — I. sibirica var. orientalis Baker Handb. Irid. (1892) 9. — I. sibirica var. haematophylla Fisch. Turcz. Catal. baical. No. 1115; Ldb. Fl. Ross. IV, 96. — Ic.: Gartenflora (1813) t. 1604; Dykes Iris tab. 1b.

Perennial, 50–75 cm tall; rhizome short, creeping, densely covered with brownish leaf vestiges; stem erect, to 70 cm long, hollow, unbranched; radical leaves commonly shorter than stem, often red-tinged at base, linear, somewhat glaucescent, not rigid, 50–70 cm long, to 8 mm broad; cauline leaves small; inflorescence solitary, terminal, of 2 or 3 flowers; pedicels unequal; spathe valves membranous, light brown or creamy; perianth tube very short, subcampanulate; outer segments suborbicular, tapering toward base, bright violet, the claw and the base of limb with a white ground; inner segments plain dark blue, slightly narrower than the outer segments; style branches shorter than the inner segments, scarcely enlarged upward; crests narrow, subquadrate, overlapping, the margins serrate; stigmas triangular; capsule oblong, about 3 times as long as broad, beakless; seeds small, relatively thick, subcubical. June. (Plate XXXI, Figure 14).

Wet meadows and deciduous woods with dwarf arctic birch. — E. Siberia: Dau.; Far East: Okh., Ze.-Bu., Uss. Gen. distr.: Jap.-Ch. Described from Japan. Type in Uppsala.

11. **I. setosa** Pall. ex Link. in Spreng, Schrader und Link, Jahrbuch. I, 3 (1820) 71; Ldb. Fl. Ross. IV, p. 96; Dykes Iris p. 92. — I. brachycuspis Fisch. ex Sims. Bot. Mag. (1824) 2326. — I. brevicuspis Fisch. ex
523 Roem. et Schult. Syst. Veg. Mant. I, 306. — I. arctica Eastwood in Botan. Gaz. XXXIII (1904) 132. — Ic.: Gartenflora (1861) 322.

Perennial, 50–100 cm tall; rhizome stout, covered with fibrous leaf vestiges; stem erect, much branched, to 1 m long, sometimes obsolete (f. serotina Kom.) or poorly developed (f. alpina Kom.); leaves ensiform, green, slightly glaucescent, commonly with a purple blotch at base, 50 cm long and 2.5 cm broad; upper cauline leaves much smaller, but a rudimentary leaf present at each ramification; spathe valves narrow, acuminate, the inner to 5 cm long, the outer short, green or suffused with purple, white-margined; flowers 2 or 3 in inflorescence, sometimes solitary (f. alpina Kom. and f. serotina Kom.); perianth tube 0.5–1 cm long, much shorter than ovary and scarcely separated by constriction;

Plate XXXII

1. Iris dichotoma Pall.– 2. I. lazica Alb.– 3. I. humilis M.B.– 4. I. tenuifolia Pall.– 5. I. tianschanica (Maxim.) Vved.– 6. I. setosa Pall.– 7. I. laevigata Fisch.– 8. I. musulmanica Fom.– 9. I. violacea Klatt.– 10. I. pseudacorus L.– 11. I. graminea L.

outer segments to 6–7 cm long, orbicular or cordate, abruptly constricted into a short claw, 3.5–4 cm long and ca. 4 cm broad, the limb bluish-purple, the claw with purple or sometimes raspberry or even white veins on whitish ground; inner segments not more than 2 cm long, commonly broad at base and abruptly narrowed to a lanceolate point; style branches short, oblong; crests subquadrate, overlapping, serrate-margined; stigmas rounded-triangular, ligulate; filaments of stamens purple or yellow suffused with purple; anthers purple; capsule strongly inflated, 3-angled with enlarged faces, barely twice as long as broad; seeds soon ripening and then swaying loosely within the capsule, light brown, lustrous, with a conspicuous seam on one side. June-July. (Plate XXXII, Figure 6).

Commons, dry and wet meadows, birch woods, shores, and peat bogs.— E. Siberia: Lena-Kol., Yen.; Far East: Kamch., Okh., Ze.-Bu., Uda, Uss., Sakh. Gen. distr.: Jap.-Ch., Ber. Described from E. Siberia. Type in Berlin.

12. I. foetidissima L. Sp. pl. ed. 1 (1753) 30; Boiss. Fl. Or. V, 127; Dykes Iris, p. 50; Ldb. Fl. Ross. IV, 19.— Ic.: Rchb. Ic. Fl. Germ. t. CCCXLII, Figure 775; Redouté Liliac. t. 354.

Perennial, 40–60 cm tall; rhizome rather slender, weak; stem ca. 50 cm long, with 2 or 3 obsolescent leaves; radical leaves thick, persistent through winter, slightly glaucescent at base, ensiform, to 45 cm long and to 2.5 cm broad; inflorescence 2 or 3, terminal, each of 2 or 3 flowers; spathe valves green throughout, firm, lanceolate, ca. 7.5 cm long; pedicels unequal, 2.5–7.5 cm long; perianth tube ca. 1.5 cm long, rounded 3-angled, separated from ovary by a constriction; outer segments obovate to orbicular, slightly emarginate, the dusky bluish-violet limb separated from
524 the dark yellowish-violet claw by a slight constriction, the claw gradually narrowed toward base inner segments narrowly obovate to oblanceolate, emarginate, the claw channeled; style branches ca. 2.5 cm long, gradually enlarged upward; crests small, deltoid; stigmas biparted, 2-toothed; filaments relatively short; anthers relatively long, reaching or even surpassing the stigmas; ovary 3-angled, gradually attenuate at both ends, with a depression on each face; seeds globose, purplish-red, not falling out of capsule even at maturity. June.

Wet meadows.— Caucasus: E. Transc. ? Gen. distr.: Atl. Eur., Med. Described from England, France and Etruria.* Type in London.

Note. This species is recorded for the Caucasus and for the USSR generally on the basis of a single imperfect specimen preserved in Marshal Bieberstein's herbarium and labelled "Iberia", Coll. Adam. Since the nearest location of this species is in Italy (Trieste), it seems reasonable to exclude it from the flora of the USSR

13. I. laevigata Fisch. in Turcz. Catal. pl. Baical. No. 1119 (nomen); Fisch. et Mey Ind. V sem. h. Petrop. 36; Ldb. Fl. Ross. IV, 97; Turcz. Fl. Baic.-Dah. II, 2, 196; Dykes Iris, p. 73.— I. Gmelini Ldb. Comment. in Gmel. Fl. Sibir. in Denkschr. d. Botan. Gesellsch. in Regensburg III, p. 48.— I. Maacki Maxim. in Bull. Acad. Petersb. XXVI (1880) 54.— Ic.: Gartenflora (1864) t. 442; Bot. Mag. (1874) t. 6132, Bot. Mag. t. 7511, sub nom. I. atropurpurea Baker.

* [Modern Tuscany and part of Umbria.]

Perennial, 60–85 cm tall; rhizome firm, sometimes fairly slender; stem erect, to 60 cm long, with a single leaf below the middle; radical leaves surpassing the stem, to 75 cm long and 4 cm broad, pale green, without a distinct midrib; spathe valves green, unequal, sharply carinate, the inner valve sometimes to 10 cm long, the outer not more than 6.5 cm long; inflorescence terminal, of 3 or 4 leaves, sometimes 2 or 3 flowers on a new branch; pedicels at first short, becoming fairly long; perianth tube to 2 cm long; outer segments broadly obovate, the limb about twice as long as the narrow channeled claw, the yellow median band of the claw reaching and sometimes extending onto the limb; inner segments blue, erect, oblanceolate; style branches enlarged upward; crests broad, rounded; capsule oblong, rounded-trigonous, obtuse; seeds compressed, the lustrous testa loose and hence the seeds float in water. June-July. (Plate XXXII, Figure 7).

525 Swamps, oxbow lakes, and lake shores. — E. Siberia: Lena-Kol., Ang.-Say., Dau.; Far East: Okh., Ze.-Bu., Uss., Uda. **Gen. distr.**: Jap.-Ch. Described from Baikal. Type in Leningrad.

14. I. Kaempferi Sieb. ex Lemaire, Illustr. hortic. V (1858) t. 157; Dykes Iris, p. 74. — I. laevigata var. Kaempferi Maxim. in Bull. Acad. St. Petersb. XXVI, 521. — Ic.: Illustr. hort. l. c. Fl. des serres tab. 2073, 2074; Gartenflora (1864) tab. 442, (1880) tab. 1773 (sub nom. I. laevigata).

Perennial, 60—95 cm tall; rhizome strong, short-creeping; stem to 75 cm long or longer, erect, with 1–3 obsolescent leaves; radical leaves ensiform, with a distinct midrib, exceeding the stem; spathe valves ca. 7 cm long, narrowly lanceolate, scaberulous; inflorescence terminal, of 3 or 4 flowers, often 2 flowers developing on a lateral branch; pedicels unequal, 1–5 cm long, elongating after anthesis; perianth tube 1–2 cm long, pale green, cylindric; outer segments ovate or oval, the limb bright purple, the narrow oblong claw yellow with purple margins; inner segments narrowly oblong-lanceolate, the same reddish-purple color as the outer segments; style branches bright violet, round-tipped; crests narrow, subquadrate; ovary rounded-trigonous; capsule short-ellipsoid, narrowed at both ends, the beak obtuse, the faces concave, the ribs emarginate; seeds flat, suborbicular. July.

Wet meadows. — Far East: Ze.-Bu., Uss. **Gen. distr.**: Jap.-Ch. Described from Japan. Type unknown.

Note. One of the favorite ornamental plants in Japan. Numerous varieties also known in European horticulture.

15. I. pseudacorus L. Sp. pl. ed. 1 (1753) 38; Kryl., Fl. Zap. Sib. III, No. 546; Ldb. Fl. Ross. IV, 97; Shmal'g., Fl. II, 468; Boiss. Fl. Or. V, 127; Dykes Iris, p. 76. — Ic.: Redouté Lil. IV (1808) t. 235; Rchb. Ic. Fl. Germ. IX, t. CCCXLIV, Figure 771. — Exs.: Pl. or. exs. No. 117.

Perennial, 75–160 cm tall; rhizome stout, to 20 mm in diameter, long, branched; stem hollow, to 150 cm long, branched in upper part; leaves green, broadly linear to linear-lanceolate, to 2 cm broad, with a distinct midrib; basal leaves often as long as the stem; spathe valves green, membranous-margined; flowers in clusters of 3–8 on stem ramifications; pedicels long and stout; perianth tube about half the length of ovary, the

segments several times as long as the tube; outer segments deflexed, ovate, pale yellow, with an orange spot at center and purple veins, abruptly
526 narrowly into claw, this about half the length of the limb; inner segments small, linear, shorter and narrower than styles; style branches oblong, ca. 3.5 cm long; crests acute, irregularly toothed at apex; capsule obscurely 3-angled, oblong-ovaloid, short-beaked; filaments creamy, suffused with purple; seeds compressed, lustrous. June-July. (Plate XXXII, Figure 10).

Swamps and wet shores of rivers and lakes. — European part: all regions except Kar.-Lap. and Dv.-Pech.; W. Siberia: U. Tob.; Caucasus: Cisc., E. Transc., Tal. Gen. distr.: Atl. and Centr. Eur., Med., Bal.-As. Min. Described from Europe. Type in London.

16. **I. halophila** Pall. Reise durch versch. Prov. russ. Reichs II, (1776) 733, No. 99. — I. Gueldenstaedtiana Lepech. in Acta Academ. Petrop. I (1781) 292; Shmal'g., Fl. II, 468; Ldb. Fl. Ross. IV, 98. — Ic.: Pall. Reise III, t. B, f. 2; Redouté Lil. tab. 310 (sub nom. I. stenogyna); M.B. Cent. pl. rar. ross. II, t. 81 (sub nom. I. diluta); Lepechin l.c. tab. 8.

Perennial, 70–100 cm tall; rhizome creeping, stout; stems erect, to 90 cm long, smooth; radical leaves lance-linear to subensiform, exceeding the stems; cauline leaves few, shorter; spathe valves commonly acute, lanceolate, membranous at apex, scaberulous or smooth; flowers 3 or 4, terminal; pedicel of lowest flower longer than the others; perianth tube about as long as ovary; outer segments subelliptic, the horizontally spreading limb abruptly passing into the claw; inner segments erect; style branches as long as the claw of outer perianth segments; ovary 6-angled, beaked; capsule 6-angled, approximate in pairs; seeds rugose. June.

Solonetz and wet meadows. — European part: Bl.; Caucasus: Cisc., Dag.; W. Siberia: U. Tob., Irt., Alt.; Centr. Asia: Balkh. Gen. distr.: Mongolia (near the borders of the USSR). Described from locations between Zhelezinka and Yamyshevo districts. Type not preserved.

Note. I. halophila, together with a number of other kindred species described below (I. sogdiana Bge, I. musulmanica Fom., I. violacea Klatt, and I. notha MB.), form a cycle of closely related species that are very difficult to distinguish and are in turn extremely close to the south European I. spuria L. and the Persian I. daenensis Kotschy. It would perhaps be correct to combine all these forms into a single species.

17. **I. sogdiana** Bge Beitr. z. Kennt. Fl. Russ. and Centr. As. in Mém. pres. à l'Acad. Sc. St. Pétersb. VII (1851) 507. — Exs.: H.F.A.M. No. 420.

Perennial, 75–110 cm tall; rhizome stout, creeping; stems to 90 cm
527 tall, somewhat compressed, smooth; radical leaves as long as the stems, linear, to 10 cm broad, acuminate; cauline leaves 4, progressively decreasing in size; spathe valves lanceolate, acuminate, carinate; flowers 3 or 4, terminal; pedicels commonly terete, that of lowest flower shorter than the rest; perianth tube ca. 8 mm long, the length of ovary; outer segments horizontally spreading, not deflexed, obovate, round-tipped,

azure with darker veins, the claw twice the length of the limb, oblong, with 2 teeth at base; inner segments erect, obovate or oblong, slightly emarginate and mucronate or obtuse, entire, brown at base, azure at apex; style branches linear-oblong; ovary 6-angled, long-beaked; seeds somewhat compressed, the uneven surface lustrous. June-July.

Wet places. — Centr. Asia: Mtn. Turkm., Pam.-Al., T. Sh. Endemic. Described from vicinity of Kermia near Melik. Type in Paris.

18. **I. musulmanica** Fomin in Monit. Jard. Bot. Tifl. XIV (1909) 46.

Perennial, 50–70 cm tall; rhizome stout, creeping; stem erect, to 40 cm long, somewhat compressed; leaves linear, to 13 mm broad; radical leaves not exceeding the stem; cauline leaves smaller; spathe valves herbaceous, lanceolate, with broad white membranous margins; flowers several, terminal; perianth tube one-third to two-fifths as long as ovary; outer segments rounded-elliptic to suborbicular, not emarginate, abruptly constricted into the claw, the lanceolate claw strongly narrowed at base; inner segments oboval, emarginate, azure-margined, gradually narrowed into the claw; style branches as long as the claw of outer perianth segments; ovary 6-angled, long-beaked, the angles approximate in pairs. June-July. (Plate XXXII, Figure 8).

Wet places. — Caucasus: E. and S. Transc. Endemic. Described from Armenia, Davalu*. Type in Tiflis.

Note. Fomin's original description mentions flowers varying in color from whitish-yellow to azure tinged with yellow. The author compares his species with I. halophila Pall. and distinguishes it from the latter by the shorter perianth tube (in I. halophila as long as ovary, in I. musulmanica one-third to two-fifths the length of ovary) and the shape of the limb of outer perianth segments. The reference to variability of perianth color suggests the existence of two forms. This resembles the position in the case of the Central Asian I. halophia sensu lato, where there are also two forms, one with yellow flowers (I. halophila Pall. s. str.), the other blue-flowered (I. sogdiana Bge). In Grossheim's
528 Flora of the Caucasus, we already find I. musulmanica Fom. among blue-flowered species, while the yellow-flowered form is referred to I. halophila Pall. which Grossheim also reports for Transcaucasia.

19. **I. notha** MB. Fl. taur.-cauc. III (1819) 45; Ldb. Fl. Ross. IV, 99; Shmal'g., Fl. II, 469. — Ic.: M.B. Cent. pl. rar. Ross. mer. tab. 77.

Perennial, 30–50 cm tall; rhizome stout, creeping; stem erect, simple, leafy, to 45 mm long; leaves linear, long-acuminate, ca. 6 mm broad, smooth; radical leaves about 50 cm long, the cauline much shorter; spathe valves herbaceous, linear-lanceolate, long-acuminate; flowers in a terminal inflorescence of 3–5; pedicels unequal; perianth tube to 20 mm long; outer segments deflexed, broadly elliptic, abruptly narrowed into the claw, dark blue, the claw with a broad yellow band; inner segments erect, oblong, strongly-narrowed at base, slightly emarginate at apex; style branches as long as the claw of outer segments; crests subacute, slightly recurved; ovary 6-angled; capsule 6-angled, beaked, the angles approximate in pairs; seeds compressed, angular, rugose. June-July.

* [Former name of town of Ararat.]

Wet places — Caucasus: Cisc. Endemic. Described from N. Caucasus, near Konstantinogorsk (Circathermas Constantinomontanas). Type in Leningrad.

20. **I. violacea** Klatt, Flora XXXV (1867-68) 384. — I. Carthaliniae Fomin. in Monit. Jard. Tifl. XIV (1909) 44. — Exs.: Pl. or. exs. No. 387.

Perennial, 50-90 cm tall; rhizome thickened, creeping; stem slightly compressed, to 85 cm long; radical leaves exceeding the stem, ensiform, to 18 mm broad; cauline leaves much smaller; spathe valves green, coriaceous, sharply carinate, the margin scarcely white-membranous; flowers in a terminal inflorescence of 4 or 5; pedicels subequal; perianth tube cylindric, about two-fifths the length of ovary; outer segments horizontally spreading (not reflexed as in I. notha MB.) deeply and sharply notched at apex, the blade sky-blue with dark blue veins, abruptly constricted into the claw, this linear-lanceolate to sublinear and slightly dilated at base, with a narrow yellowish median line; inner segments erect, oblanceolate, emarginate, gradually narrowed into claw; style branches slightly shorter than the claw of outer segments; capsule ovaloid-cylindric, 6-angled, long-beaked, the angles approximate in pairs. June-July. (Plate XXXII, Figure 9).

Wet places. — Caucasus: E. Transc. Endemic. Described from the Caucasus. Type in Berlin.

529 21. **I. graminea** L. Sp. pl. ed. I (1753) 39; Boiss. Fl. Or., V, 128; Shmal'g., Fl. II, 469; Dykes Iris p. 65; Ldb. Fl. Ross. IV, 94. — I. Adami Willd. in herb. Linn. in Spreng, Schrad. i. Link, Jahrb. 1, 3 (1820) 72. — Ic.: Bot. Mag. t. 681 (1803); Redouté Lil. (1809) t. 299.

Perennial, 40-60 cm tall; rhizome slender, branched, giving rise to dense tufts; stem strongly compressed, prominently ribbed; leaves narrowly ensiform to narrowly linear, firm, with several distinct veins, bright green and lustrous above, pale grayish-green beneath; spathe valves to 25 cm long, sharply carinate, the lower bract usually much longer than the upper; flowers solitary or in pairs; pedicels to 6 cm long, rounded-triangular in section; perianth tube short, funnelform; outer segments with purple veins on yellowish-white ground, the suborbicular limb separated from the claw by a gentle but distinct constriction; inner segments broadly lanceolate, short-unguiculate, slightly shorter than outer segments; style branches carinate, enlarged upward, pale purple; crests broadly 3-angled; stigmas with 2 ligulate projections; anthers purple; capsule 3-4 cm long, abruptly attenuate at the top, 6-angled, 3 angles broader than the other 3; seeds pyriform, sometimes slightly compressed, the testa papery rugose. June. (Plate XXXII, Figure 11).

Subalpine meadows. — European part: M. Dnp., Bl.; Caucasus: W. Transc., Cisc., Dag. Gen. distr.: Atl. and Centr. Eur., Med., Bal.-As. Min. Described from Austria. Type in London.

22. **I. humilis** M. B. Fl. taur.-cauc. I (1808) 33; Ldb. Fl. Ross. IV, 95; Shmal'g., Fl. II, 469; Boiss. Fl. Or. V, 125; Dykes Iris p. 68. — Neubeckia humilis Alef. Bot. Zeit. XXI (1863) 297. — Ioniris humilis Klatt, Bot Zeit. XXX (1872) 502. — Iris pontica Zapal. Fl. Galic. I (1906) 191. — Ic.: M. B. Cent. pl. ross. t. XXXI.

Perennial, 15-35 cm tall; rhizome stoutish; stem obsolescent, the peduncle not more than 2-3 cm long; leaves 2, radical, linear-lanceolate,

to 35 cm long and 6 mm broad, firm, distinctly veined; spathe valves 5–6 cm long, very close to the pair of leaves; pedicels very short; perianth tube 2–5 cm long, gradually enlarged upward, 3–4 (sometimes 5) times as long as ovary; outer segments suborbicular, the limb clearly separated by a constriction from the winged claw, the basal part of the limb dark purple with darker veins, the claw marked with bright reddish-brown veins and spots on a greenish-yellow ground; inner segments oblanceolate, unguiculate, bluish-purple; style branches obscurely carinate, narrowed at base and enlarged upward; crests subquadrate, strongly recurved;
530 stigmas 2-lobed, with 2 teeth; filaments yellow; anthers azure; ovary cylindric, 3-angled, the angles somewhat concave; capsule short and broad, the angles 2-ribbed; seeds globose or pyriform, reddish-brown, the testa papery. May-June. (Plate XXXII, Figure 3).

Steppes. — European part: M. Dnp., Bl.; Caucasus: Cisc. Gen. distr.: Eur., Bal.-As. Min. Described from the subalpine zone of the Caucasus, near Narzan. Type in Leningrad.

23. **I. Ludwigii** Maxim. in Bull. Acad. Sc. Petersb. XXVI (1880) 528; Kryl., Fl. Zap. Sib. III, 661, No. 582.

Perennial, 25–40 cm tall; rhizome stout, creeping; stem obsolete, the peduncle not more than 2–3 cm long; leaves 2–4, radical, linear-lanceolate, firm, distinctly 5–7-nerved, to 40 cm long and 5 mm broad; spathe of 3 lanceolate valves inserted close to a pair of leaves; flowers commonly 2, violet-blue; pedicels very short; perianth tube slender, filiform, 3 or more times as long as the ovary and about equaling the perianth segments; claw of outer segments narrow, twice as long as the ovate limb, covered with short unicellular hairs; inner segments shorter than the outer, oblong, narrowed toward base; style branches linear; stigmas biseriate; filaments yellow. May.

Steppe meadows, thickets of Stipa splendens, and gravelly slopes. — W. Siberia: Alt. (Zyryanovskii mine on Bukhtarma and Katon-karagai). Endemic. Described from S. Altai, near Zyryanovskii mine. Type in Leningrad.

Note. This species was described by Maksimovich from a single specimen separated in the herbarium from among collections of I. ruthenica According to Dykes (Iris, p. 68, 69) this plant belongs to I. humilis MB., but it is difficult to agree with this statement.

Section **PERDANTHOPSIS** (Hance) Baker, Handb. Iridac (1892) 7, 16. — Stems much branched, the branches sometimes apparently dichotomous.

24. **I. dichotoma** Pall. Reise durch. versch. Prov. russ. Reichs III (1773) 712; Dykes Iris p. 96. — Pardanthus dichotomus. Ldb. Fl. Ross. IV, 106; Turcz. Fl. Baic.-Dah. II, 2, 199. — Ic.: Pall. l.c. tab. A, Figure 2; Bot. Mag. tab. 6428.

Perennial, 50–100 cm tall; rhizome slender; stem more than 5 cm long, much branched, the branches often arising opposite each other and thus apparently dichotomous, each branch subtended by a short bract; leaves bluish-green, whitish-margined, 6–8 flabellately arranged in one plain at the stem base to 40 cm long and 3.5 cm broad, the basal leaves often falcate; spathe valves short, coriaceous throughout; inflorescence

3–5-flowered; pedicels to 4 cm long, terete, distinctly jointed below the
531 ovary; perianth tube very short, not exceeding 2 mm; limb of outer segments horizontally spreading, white with few brownish-purple spots, gradually passing into the claw, this at an angle of 60°, purple-dotted on a white ground at center and yellowish brown at margins; inner segments much shorter than the outer, ascending at and angle of about 60°, gray with purple stripes, the blade rounded-oblong, the claw channeled and marked with brownish-purple dots; style branches suboval, the median band suffused with purple, the margins colorless and almost transparent; crests narrow, lindar, relatively long; stigmas with 2 prominent teeth; ovary cylindric, readily pulled off after flowering if unfertilized; capsule oblong, to 4 cm long, the face deeply channeled. August-September. (Plate XXXII, Figure 1).

W. Siberia: Ang.-Say. (?), Dau.; Far East: Ze.-Bu. Gen. distr.: Mong , Jap.-Ch. Described from Dauria from Ingoda to Argun. Type not known.

Section ONCOCYCLUS Baker in Journ. Linn. Soc. XVI (1877) 142.— Oncocyclus Siemssen in Bot. Zeit. IV (1846) 706.

Characterized by a solitary flower at the end of a rather short stem; outer perianth segments covered on lower part with velvety hairs; inner segments as long as or much longer and broader than the outer. This section contains the most beautiful iris species, greatly valued by horticulturists. The distinguishing features of some of the species described below are very insignificant and in certain instances do not extend beyond distinct coloration of perianth segments.

1. Outer and inner perianth segments the same color, violet, azure or pale yellow, the inner slightly broader than the outer . . . . . 27. I. **Camillae** Grossh.
+ Outer and inner perianth segments differing in color, and if similarly colored then brown . . . . . 2.
2. Outer and inner perianth segments orbicular, about equal in size . . . . 3.
+ Outer and inner perianth segments differing markedly in size and shape. . . . . 5.
3. Outer and inner perianth segments brownish-purple . . . . . 33. I. lycotis Woron.
532 + At least the outer segments not brownish-purple . . . . . 4.
4. Ground color of inner perianth segments almost white or pale azure . . . . . 25. I. **iberica** Hoffm.
+ Ground color of inner perianth segments pale smoky-yellow . . . . . 26. I. **elegantissima** Sossn.
5. Outer segments consisting of a long linear claw and a small semicircular limb, the two elements distinct, the claw densely covered with velvety hairs . . . . . 6.
+ The large oblong limb passing imperceptibly into the claw, this destitute of velvety pubescence . . . . . 7.
6. Inner segments bright violet or dark violet; anthers azure . . . . . 34. I. **paradoxa** Stev.

+ Inner segments white, bluish-violet veined; anthers pale yellow. . . . . 35. I. Medwedewi Fom.

7. Hairs on lower part of outer segments yellow . . . . . .30. I. Schelkownikowi Fom.

+ Hairs on lower part of outer segments brown . . . . . 8.

8. Outer segments with 2 patches . . . . . I. Fomini Woron.

+ Outer segments with a single patch . . . . . 9.

9. Outer segments obtuse, orbicular, 3–3.5 cm long . . . . . .32. I. Grossheimi Woron.

+ Outer segments oblong-linear, acute, 4–4.5 cm long . . . . . 10.

10. Outer segments horizontally spreading . . . . . 31. I. Ewbankiana Forst.

+ Outer segments reflexed at the middle . . . . 28. I. acutiloba C.A. May.

25. I. **iberica** Hoffm. in Comm. Soc. phys. Mosqu. I, 41 (1806–08); M. B. Fl. taur.-cauc. I, 32 (1808); Ldb. Fl. Ross. IV, 105; Boiss. Fl. Or. V, 131; Dykes I, 111. — I. Helena C. Koch. in Linnaea XXI (1848) 639. — Ic.: Gartenfl. (1863) t. 386, (1872) t. 713; Flore des serres (1873) tab. 1963; Radde Mus. Caucas. II t. 1 (1901). — Exs.: Herb. Fl. Cauc. No. 61.

Perennial, 15–20 cm tall; rhizome slender, creeping; stem to 15 cm long, erect, bearing a solitary terminal flower; leaves glaucescent, narrowly linear, subfalcate, not exceeding the stem; spathe valves lanceolate, acute, carinate, herbaceous-membranous; pedicel very short; perianth tube cylindric, fairly long; outer segments at first horizontal, finally recurved, distinctly concave, the limb orbicular to rounded-oblong, the limb with a triangular purplish-black patch on a whitish-yellow ground,
533 the margin densely netted-veined with purple, the claw broad, the crest hairs, purplish-black; inner segments often narrower than the outer, connivent, much lighter in color than the outer segments, the limb orbicular, the claw short; style branches recurved, adherent to outer segments, strongly convex, dark purplish-brown at base, fading toward apex to almost milky white with brownish-purple veins; style crests rather small, triangular, recurved; stigmas entire, light brown; filaments pale purple; anthers milky, capsule 3-angled ellipsoid. May. (Plate XXXIII, Figure 8).

Stony slopes. — Caucasus: E. Transc. Endemic. Described from the vicinity of Tiflis. Type in Leningrad.

26. **I. elegantissima** Sosn. in Monit. Jard. bot. Tiflis (1915) 2. — I. speciosissima Sosn. in herb.; Filippov, ibid. (1917) 48.

Perennial, 15–25 cm tall; rhizome short, creeping; stem to 20 cm long, erect, bearing a solitary terminal flower; leaves narrowly linear, subfalcate, not exceeding the stem; pedicel short; perianth tube to 15 mm long, cylindric; outer segments deflexed, concave, transversely rounded-oval, yellowish-brown, veined and spotted dark brown, with a large dark brown patch at center; inner segments slightly longer and broader than the outer, violet-veined on a pale smoky yellow ground. May. (Plate XXXIII, Figure 1).

Dry slopes. — Caucasus: S. Transc. **Gen. distr.**: Arm.-Kurd., N. Iran. Described from Kars area. Type in Tiflis.

27. I. **Camillae** Grossh. in Sched. ad herb. A. Grossh. et B. Schischk. Plante orientales exsiccatae (1928). — Exs.: l. c. No. 357.

Perennial, 20–40 cm tall; rhizome short, creeping; stem to 40 cm long, erect, bearing a solitary terminal flower; leaves narrowly linear, subfalcate, not exceeding the stem; spathe valves lanceolate, acute, carinate, herbaceous-membranous; pedicels fairly long; perianth tube slightly longer than ovary; outer segments short-ligulate, broadly obovate, deflexed, slightly narrowed at apex, pale yellow or azure-violet, sometimes with a violet patch; hairs of claw yellow; inner segments about the same size as but slightly broader than and same color as outer segments, erect; style branches recurved, shorter than the outer segments; crests short, recurved. April.

Stony places. — Caucasus: E. Transc. Endemic. Described from Lake Kazan-gel'. Type in Leningrad.

28. **I. acutiloba** C. A. Mey. in Verz. Pfl, Cauc. (1831) 32; Ldb. Fl. Ross. IV, 105; Boiss. Fl. Or. V, 132; Dykes Iris, 113. — Ic.: Tr. Tifl.
534 Bot. Sada VI, 3, facing page 42 (var. lineolata Trautv.).

Perennial, 8–15 cm tall; rhizome firm, compressed; stem erect, to 10 cm long, bearing a solitary terminal flower; leaves all radical, to 10 cm long and 6 mm broad, linear, subfalcate, usually not overtopping the flower; spathe valves lanceolate, acuminate, green, to 5 cm long; pedicel very short; perianth tube cylindric, ca. 5 cm long, green dotted with purple; limb of outer segments lanceolate, strongly deflexed, gradually passing into the claw, light broad with purplish-brown veins and a rather small round dark purplish-brown spot, the lower part covered with dark brown hairs, the claw destitute of velvety pubescence; inner segments commonly much longer than the outer, sometimes only slightly longer (var. lineolata Trautv.), always broader than the outer segments, oblong-lanceolate, acute, light brown, unspotted, veined brownish-purple; ovary [?] cylindric, style branches more densely brown-spotted. March. (Plate XXXIII, Figures 5 and 9).

Dry hills. — Caucasus: E. Transc., Tal. Endemic. Described from E. Transc. Type in Leningrad.

Note. The report by Dykes (Genus Iris, p. 113) for the Danube estuary, referring to a specimen collected by Sintenis and marked Bailovo, is definitely due to a misunderstanding, as Bailov is situated near Baku and it is there that the plant was collected by Sintenis on March 15, 1900. The specimen is preserved since then in the herbarium of the Botanical Institute of the Academy of Sciences. The name of the locality in the Danube estuary is Brailovo and not Bailovo.

29. **I. Fomini** Woron. in Grossg., Fl. Kakv. I (1928) 285. — I. acutiloba C.A. Mey var. bimaculata Fom. in Fomin and Voronov, Opred. rast. Kavk. I (1907) 300.

Perennial, 10–20 cm tall; rhizome short, creeping; stem to 15 cm long, erect, bearing a solitary terminal flower; leaves several, narrowly linear, subfalcate, not exceeding the stem; perianth segments lanceolate, acute, carinate, herbaceous; pedicel short; perianth tube to 15 mm long, cylindric; outer segments lanceolate, acute, the upper third reflexed, the limb with 2 spots, of these one orbicular purplish-violet at center and the outer rounded-reniform brown near the apex; inner segments erect, veined with

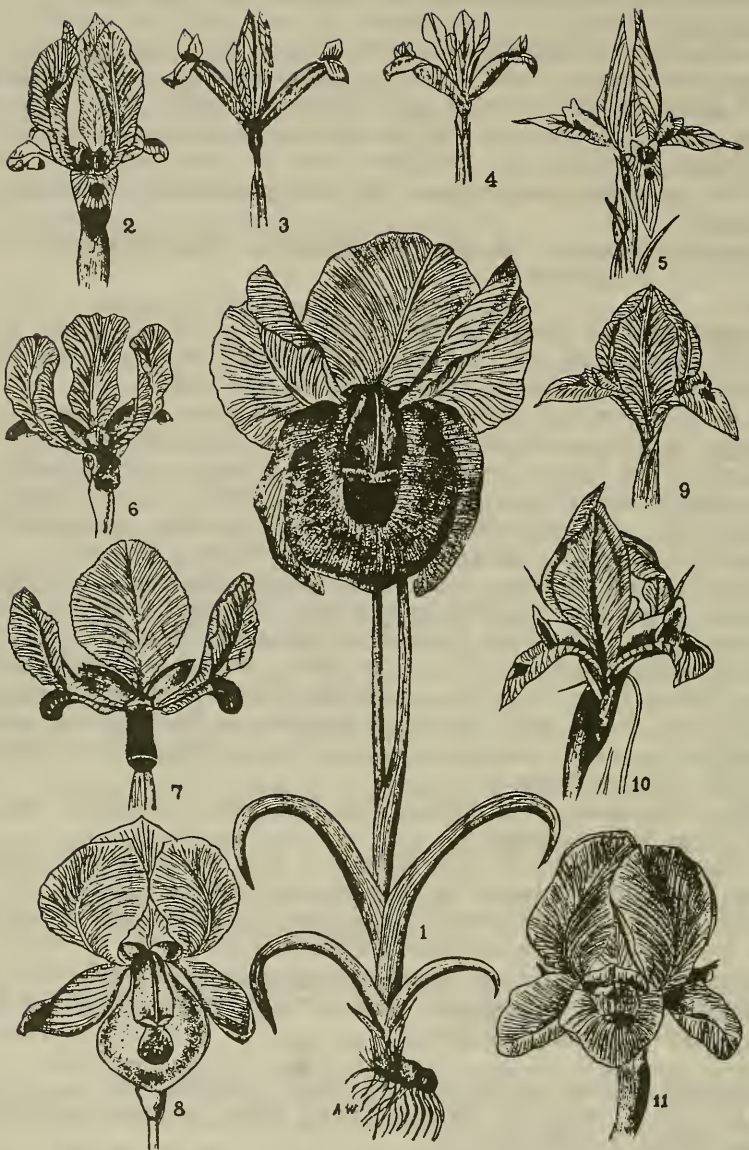

Plate XXXIII

1. Iris elegantissima Sosn.– 2. I. Fomini Woron.– 3, I. reticulata M.B.– 4. I. hyrcana Woron.– 5. I. acutiloba var. lineolata Trautv.– 6. I. Medwedewii Fom.– 7. I. paradoxa Stev.– 8. I. iberica Hoffm.– 9. I. acutiloba C.A.M.– 10. I. Schelkownikowii Fom.– 11. I. lycotis Woron.

536 purplish-violet, oblong-lanceolate, acute, much longer and somewhat broader than the outer. April. (Plate XXXIII, Figure 2).

Dry hills. — Caucasus: E. Transc. Endemic. Described from Baku. Type in Tiflis.

30. I. **Schelkownikowi** Fom. in Fom. and Vor., Opred. rast. Kr. i Kavk. I (1907) 299. — I. acutiloba C.A. May var. Schelkownikowi Fom. in Tr. Tifl. Bot. Sada VI, No. 3 (1904) 44. — Ic.: Tr. Tifl. Bot. Sada VI, p. 44.

Perennial, 20–35 cm tall; rhizome short, creeping; stem to 30 cm long, erect, bearing a solitary terminal flower; leaves narrowly linear, subfalcate, not exceeding the stem; spathe valves lanceolate, acute, carinate, herbaceous-membranous; perianth tube rather long; outer segments oblong-lanceolate, acute, much smaller than the inner segments, brown, with a round purple patch at center and purplish-lilac veins, the hairs of the claw yellow; inner segments oval-oblong, acutish, violet or bluish-violet, with slender dark veins; style branches shorter than outer segments, brown; stigmas broadly triangular. April. (Plate XXXIII, Figure 10).

Hills. — Caucasus: E. Transc. Described from Azerbaijan, from hills of Karadzhi-dag, Boz-dag Range.

31. I. **Ewbankiana** Foster in Gard. Chron. XXIX (1901) 397; Dykes Iris, p. 112. — Ic.: Gard. Chron. l.c. Figure 152.

Perennial, 20–35 cm tall; rhizome short, creeping; stem to 30 cm long, erect, bearing a solitary terminal flower; leaves narrowly linear, subfalcate, not exceeding the stem; spathe valves to 15 mm long, cylindric; outer segments lanceolate, acuminate, distinctly veined with brownish-purple on a milky white ground, the limb horizontal and not reflexed as in related species; inner segments obovate-lanceolate, veined with brownish-purple on a milky white ground, the claw sometimes covered with few yellow brown-tipped hairs; style branches short, chocolate-brown; crests quadrate, with slender brownish-purple veins; stigmas oblong, entire; filaments brownish-purple; capsule cylindric, narrowed at both ends. April-May.

Grassy mountain slopes. — Centr. Asia: Mtn. Turkm. **Gen. distr.**: Bal.-As. Min. Cappadocia — var. Elisabethae (Siehe) Dykes; Tavr — var. Sprengeri (Siehe) Dykes; it is possible that both these forms are in fact distinct species. Described from mountains some 125 km from
538 Ashkhabad (apparently Kara-kala area, Mount Syunt). Type in Leningrad.

32. I. **Grossheimi** Woron. in Grossg., Fl. Kavk. I (1928) 255.

Perennial, 10–15 cm tall; rhizome slender, creeping; stem to 1 cm long, erect, bearing a solitary terminal flower; leaves as long as the stem, narrowly linear, subfalcate; spathe valves lanceolate, acute, green; pedicel short; outer segments obtuse, orbicular, a blackish-brown patch covering most of the limb, the rest light-brown with brownish-purple veins, the hairs of the claw almost black; inner segments oblong-oval, obtuse, much longer and broader than the outer, a dark brown batch also covering most of the limb, the rest light brown veined with brownish-purple. May.

Rocky slopes in the upper mountain zone (2400–3000 m). — Caucasus: E. Transc. Endemic. Described from Nakhichevan Republic, Mount Soyukh. Type in Baku.

33. I. lycotis Woron., Izv. Kavk. Muzeya IX (1915) 33.

Perennial, 25–35 cm tall; rhizome short, creeping; stem to 30 cm long, erect, bearing a solitary terminal flower; leaves narrowly linear, subfalcate, not exceeding the stem; spathe valves lanceolate, acute, carinate, herbaceous-membranous; pedicel rather long; perianth tube about as long as ovary; outer segments orbicular, purple-violet, with a large velutinous black patch at center; inner segments upright, slightly larger than the outer, profusely veined with purplish-violet on a light-colored ground. The great variability of perianth coloration prompted A. Grossheim to establish a number of varieties (var. magnifica Gross. — ground color dark cherry-red; var. heterochroa Grossh. — ground color of outer segments brownish-cherry, of the inner segments light; var. typica Grossh. — both inner and outer segments distinctly veined on a light ground; var. panthera Grossh. — spots on a light ground; var. pardus Grossh. — the inner segments veined, the outer spotted, on a light ground), style branches dark reddish-brown, shorter than perianth segments; crests toothed. April-May. (Plate XXXIII, Figure 11).

The middle mountain zone. — Caucasus: E. Transc. — Darry-dag and Negramskie mountains. Endemic. Described from Nakhichevan Republic, north of Dzhul'fa, on Darry-dag slopes. Type in Leningrad.

34. I. paradoxa Stev. in Mém. Soc. Natur. de Moscou V (1820) 355; Ldb. Fl. Ross., IV, 105; Boiss. Fl. Or. V, 132; Dykes Iris, p. 110. —
539 Exs.: Pl. or. exs. No. 62. — Ic.: Gartenfl. (1863) t. 386; Bot. Mag. (1889) t. 7081; Radde, Mus. Cauc. (1901) t. 1.

Perennial, 25–40 cm tall; rhizome short, creeping; stem to 30 cm long,; erect, bearing a solitary terminal flower; leaves several, narrowly linear, subfalcate, not exceeding the stem; spathe valves lanceolate, acute, carinate, herbaceous-membranous; pedicel rather long; perianth tube slightly shorter than ovary; outer segments linear, horizontally spreading, almost black-violet, the claw densely covered with blackish-purple hairs, the rather small suborbicular limb not point-tipped; inner segments much larger than the outer, oval-orbicular, subtruncate, bright violet or dark violet; anther azure; style branches brown, spotted; crests short, rounded. May. (Plate XXXIII, Figure 7).

Dry slopes in the mountain zone; sometimes associated with calcareous soil. — Caucasus: S. and E. Transc. Endemic. Described from Transcaucasia. Type in Helsinki.

35. I. Medwedewi Fom. in Monit. Jard. Tifl. XIV (1909) 43; Dykes Iris, 110.

Perennial, 30–45 cm tall; rhizome short, creeping; stem to 40 cm long, erect, bearing a solitary terminal flower; leaves several, narrowly linear, subfalcate, not exceeding the stem; spathe valves lanceolate, acute, carinate, herbaceous-membranous; pedicel rather long; perianth tube slightly shorter than ovary; outer segments linear, horizontally spreading, the claw densely covered with blackish-purple hairs, its margin veined

blackish-purple, the rather small suborbicular blackish-purple limb often point-tipped; inner segments much larger than the outer, subtruncate, irregularly toothed-margined, white, densely veined azure-violet, concave within, carinate outside, with scattered hairs at base; anthers pale yellow; style branches shorter than the outer perianth segments, brown, spotted cinnamon-brown, the margins revolute; style crests short, rounded. May. (Plate XXXIII, Figure 6).

Dry hills. — Caucasus: Tal. **Gen. distr.**: Arm.-Iran. Described from Talysh, near village of Kosmal'an. Type in Tiflis.

Section **REGELIA** Lynch. The Book of the Iris (1904) 116. — Resembling the section Oncocyclus, but stem longer, up to 75 cm, bearing 2 or 3 flowers instead of 1; perianth segments broader, pointed at apex, the beard consisting of long hairs; seeds distinctly arillate.

The few species of this section are all confined to the mountain massifs of Soviet Central Asia and do not occur elsewhere. They occur chiefly in
540 central Pamir-Alai and only a few locations in W. Tien Shan. The differences between the species are very insignificant and identification is very difficult. All the species are of great horticultural value owing to their beautiful flowers; they are, moreover, very hardy plants, as opposed to the species of the section Oncocyclus that are extremely fastidious in cultivation.

1. Flowers mainly lilac. . . . . 2.
+ Flowers mainly brown, gray or whitish tinged with lilac . . . . . 3.
2. Leaves 1–1.5 cm broad; inner perianth segments gradually narrowed in the claw . . . . . 39. I. Hoogiana Dykes.
+ Leaves ca. 0.5 cm broad; inner perianth segments abruptly narrowed into the claw . . . . . 40. I. karategina B. Festsch.
3. Perianth brownish with dark brown veins and a dark patch at the throat of outer segments . . . . . 38. I. Korolkowi Rgl.
+ Perianth color different from above . . . . . 4.
4. Perianth segments lilac at center, with a broad bronze margin and dark spots; plants commonly producing rather long stolons . . . . . 36. I. stolonifera Maxim.
+ Perianth segments greenish-yellow, with oblique raspberry-colored veins; plants not stoloniferous . . . . . 37. I. darvasica Rgl.

36. **I. stolonifera** Maxim. in Bull. Acad. Sc. St. Petersb. XXVI (1880) 535; Dykes Iris, 125. — I. Leichtlini Rgl. in A.H.P. VIII (1884) 680. — I. vaga Foster, Gartenfl. (1887) 201–5. — Ic.: Gartenfl. tab. 1244; Dykes Iris, tab. 29.

Perennial, 30–60 cm tall; rhizomes very short, with long fleshy root fibers; long fleshy stolons arising from the collar through the sheaths of old leaves; stems erect, bearing 2 or 3 terminal flowers; radical leaves obsolete; cauline leaves broadly linear, 5–11 mm broad, up to 50 cm long, gradually attenuate toward apex; uppermost stem leaf not reaching the base of spathe; lower spathe valves obtusish, the inner shorter and narrower than the outer; pedicels 2–4 mm long; outer perianth segments obovate, obtuse, the base of the limb and the claw bearded with yellow clavate hairs,

the blade lilac with a broad bronze-colored margin, the lower part whitish or yellowish-ferruginous; inner segments slightly narrower and shorter than the outer, pale lilac, undulate, the margin crisped; style branches
541 pale lilac; crests brown; capsule elongate acuminate; seeds pyriform, with a milky white aril. May-June.

Wet meadows and near mountain streams. — Centr. Asia: Pam.-Al. Endemic. Described from Sangydzhuman Ravine on the Zeravshan. Type in Leningrad.

Note. Dykes (in Garden Chron. vol. LXV (1912) 256–258) describes and illustrates under the name I. turcomanica a garden hybrid between I. stolonifera and I. Korolkovi Rgl.

37. **I. darvasica** Rgl. in A.H.P. VIII (1884) 679; Dykes Iris, 126. — I. Suworowi Rgl. in A.H.P. IX (1886) 619.

Perennial, 20–35 cm tall; rhizome rather stout, firm, creeping, covered at the top with fibrous vestiges of leaf sheaths; stem erect, covered at base with leaf sheaths, bearing several leaves, somewhat branched at the end; leaves erect, narrowly linear-ensiform, ca. 1 cm broad; spathe valves oblong-navicular, herbaceous at base, above the middle and at margins membranous; perianth tube shorter than the spathe but exceeding the ovary; limb of outer perianth segments obovate or linear, acute, narrowed at base into the claw, greenish-yellow with oblique raspberry-colored veins, the bluish beard reaching beyond the middle of the limb; inner segments nearly identical with the outer. June. (Plate XXXIV, Figure 8).

Mountain slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Mount Ala-kisryak east of Lulyab mountains (Tadzhikistan). Type in Leningrad.

38. **I. Korolkowi** Rgl. in A.H.P.I (1873) 432; Dykes Iris, 124. — Ic.: Gartenflora (1873) t. 766.

Perennial, 40–60 cm tall; rhizome short, firm; stem erect, branched at the end; leaves glaucescent, the cauline progressively decreasing in size, linear-ensiform, slightly acuminate, nearly straight; spathe valves herbaceous, slightly ribbed, broadly lanceolate, membranous and translucid only at apex; pedicels very short; flowers 2, very close together; perianth tube subcylindric, rather short; limb of outer segments elliptic, abruptly narrowed into the claw, spreading, emarginate, dingy white with purple veins, the claw blackish-brown within; inner segments nearly identical with the outer; filaments blackish-brown; style branches oblong, brown; crests acute, bearded at the margin. June.

Mountain slopes. — Centr. Asia: T. Sh., Pam.-Al. Endemic. Described from cultivated specimens, grown from rhizomes supplied by N. Korol'kov from mountains near Tashkent, and not from Turkmenia as erroneously reported by E. Regel. Korol'kov never collected plants in Turkmenia and generally at that time, in the early seventies of last century, the mountains of Turkmenia were inaccessible to Europeans. Type in Leningrad.

542 39. **I. Hoogiana** Dykes in Garden. Chron. vol. LX (1916) 216. — I. splendens O. Fedtsch., in herb. (1913); O. Fedchenko in Bull. Jard. Bot. Princ. XXIII (1924) 111. — Ic.: Gard. Chron. LX (1916) Figure 84.

Perennial, 40–60 cm tall; rhizome short, the long stolons emerging through the sheaths of old leaves and spreading in different directions; stems erect, bearing 2 or 3 terminal flowers; radical leaves obsolete; cauline leaves broadly linear, attenuate toward apex, acuminate, the upper third membranous, tinged with red; pedicels short; perianth tube ca. 2.5 cm long, purple-tinged; limb of outer segments oboval, gradually narrowed into the claw, plain lilac-violet or sometimes white, the beard spreading partly onto the limb and not confined to the claw as in I. Korolkowi Rgl.; inner segments same color as the outer, gradually enlarged from base; style branches not differing in color from perianth segments; crests triangular, straight; capsule elongated, pointed at the top; seeds pyriform, brown, with a milky white aril. May. (Plate XXXIV, Figure 2).

Grassy mountain slopes. — Centr. Asia: Pam.-Al. Endemic. Described from a cultivated specimen grown in the horticultural firm of Tubergen (Haarlem) from rhizomes collected in Central Asia. Type not preserved.

40. I. karategina B. Fedtsch. in Izv. Tadzh. bazy A.N. II (1935).

Perennial, 25–40 cm tall; rhizome short, often giving rise to short stolons; stems erect, bearing 2 or 3 terminal flowers, surrounded at base with fibrous vestiges of old leaves; leaves nearly all cauline, broadly linear, attenuate toward apex, slightly recurved, ca. 15–20 cm long, ca. 5 mm broad; spathe valves carinate, acuminate, the upper one-third membranous; pedicels short; perianth tube 2.5–4 cm long; blade of outer segments oboval, gradually narrowed into the claw, essentially violet, the beard spreading slightly onto the limb as in I. Hoogiana; inner segments the same color as the outer, rather abruptly narrowed into a very narrow claw; style branches not differing in color from perianth segments; crests lanceolate, long-acuminate. May.

Mountain slopes, at an altitude of about 1600 m. — Centr. Asia: Pam.-Al. Endemic. Described from Tadzhikistan, Karateginskii Range, Zardalyu Pass. Type in Leningrad.

Section POGONIRIS Baker in Journ. Linn. Soc. XCI (1877) 143. — Tall or low; rhizome and stem sometimes branched; flowers 1–3, terminal; outer perianth segments densely bearded with multicellular hairs; seeds not arillate.

543 1. Leaves filiform or narrowly linear . . . . . 2.
\+ Leaves broadly linear or ensiform . . . . . 3.
2. Leaves subterete, nearly all erect; perianth tube not more than 24 mm long . . . . . 41. I. longiscapa Ldb.
\+ Leaves channeled, more or less recurved; perianth tube up to 30 mm long . . . . . I. falcifolia Bge.
3. Flower solitary; spathe 2-valved . . . . . 4.
\+ Inflorescence of 2, rarely 3 or 4 flowers; spathe commonly 3-valved . 7.
4. Base of stem not covered with vestiges of leaf sheaths . . . . . 5.
\+ Base of stem covered with vestiges of leaf sheaths . . . . . 6.
5. Spathe valves much longer than perianth tube; inner segments gradually narrowed into the claw . . . . . 45. I. Timofejewi Woron.

+ Spathe valves equaling or shorter than perianth tube; inner segments abruptly narrowed into the claw . . . . . 44. I. pumila L.
6. Stem obsolete; leaves obtuse; perianth tube as long as or longer than the segments . . . . . .46. I. Potanini Maxim.
+ Stem short; leaves acuminate; perianth tube much shorter than the segments . . . . . 47. I. tigridia Bge.
7. Stem simple, terminating in a 2-flowered inflorescence . . . . . 8.
+ Stem branched, usually rather long . . . . . 10.
8. Perianth funnelform; spathe valves inflated . . . . . 9.
+ Inner perianth segment spreading; spathe valves not inflated . . . . . 43. I. flavissima Pall.
9. Outer segments much longer than the inner; flowers commonly yellow. . . . . 48. I. Bloudowii Ldb.
+ Outer segments about as long as the inner; flowers commonly lilac . . . . . 49. I. scariosa Willd.
10. Stem branched at or even below the middle . . . . . 50. I. aphylla L.
+ Stem branched only in upper part . . . . . .11.
11. Flowers bluish-violet . . . . . 12.
+ Flowers yellow, sometimes violet-veined . . . . . 13.
12. Style crests rounded, overlapping . . . . . 54. I. Alberti Rgl.
+ Style crests spreading . . . . . 53. I. germanica L.
13. Spathe valves at anthesis green, not coriaceous. . . 51. I. variegata L.
+ Spathe valves at anthesis partly coriaceous. . . 52. I. imbricata Lindl.

544 41. I. longiscapa Ldb. Fl. Ross. IV (1853) 93. — I. filifolia Bge. in Mém. pres. à l'Acad. Sc. St. Pétersb. div. sav. étr. VII (1851) 506, non I. filifolia Boiss. Voy. Espagne (1839–45) 602.

Perennial, 50–75 cm tall; rhizome creeping, abbreviated, consisting of nutlike fragments (smaller than in I. falcifolia Bge), one such fragment developing each year; roots numerous, thick, densely covered with fibrous leaf vestiges; stem leafless, erect, to 70 cm long, more slender than in I. falcifolia Bge.; leaves all radical, narrowly filiform, not falcate, at length greatly elongating; spathe valves 3, more pointed than in I. falcifolia, thinner, sometimes almost hyaline throughout or at least the margin broadly hyaline; pedicels short; flower 2 or 3, lilac-violet, somewhat smaller than in I. falcifolia Bge.; outer segments oblong, much narrower than in I. falcifolia Bge., bearded, the hairs at the middle of the beard clavate, yellow, at the margins slender and paler; inner segments narrowly spatulate, with few clavate hairs on the claw or sometimes glabrous throughout; capsule 3-angled, pointed. April-May. (Plate XXXIV, Figure 10).

Clayey deserts; sometimes sandy-clay sites or granite hills. — Centr. Asia: Kyz. K., Kara K., Mtn. Turkm. Endemic. Described from deserts of Kyzyl-Kum from Chakyrat to Yany-darya (I. filifolia Bge, non Boiss.). Type in Leningrad.

42. I. falcifolia Bge, in Mém. pres. à l'Acad. Sc. St. Pétersb. div. sav. étr. VII (1851) 505; Dykes Iris, 127. — Ic.: Dykes l. c., 128.

Perennial, 50–100 cm tall; rhizome creeping, abbreviated, consisting of nutlike fragments, one such fragment developing each year; roots numerous, thick, covered with fibrous vestiges of leaf sheaths; stem

leafless, to 90 cm long (including flowers); leaves subradical, the 2 at the base of each scape translucent, vaginate, short, the 3 upper ones falcate filiform-linear from a sheathing base; spathe valves 4, scabrous, membranous-margined, the outer entire, the inner ones 2-cleft, a fourth minute valve sometimes present; pedicels short; flowers 2 or 3, lilac-violet; outer segments, the broadly ovate claw separated from the limb by a constriction, the upper one-third of the limb horizontally spreading or reflexed; inner segments spatulate-oblong, about as long as the outer, the lower two-thirds bearded, the rather sparse beard consisting of
545 yellowish hairs; style branches pale lilac; crests overlapping, semiovate. March.

Clayey deserts. — Centr. Asia: Kyz. K., Kara K. Endemic. Described from clayey desert between Bukhara and Kermin. Type in Paris.

43. I. flavissima Pall. Reise durch. versch. Prov. russ. Reichs I (1771) 715; III (1776) 715; Ldb. Fl. Ross. IV, 172; Turcz. Fl. baic.-dah. II, 2, 197; Kryl., Fl. Zap. Sib. III, 669; Dykes Iris, 137. — I. arenaria Waldst. et Kit. Fl. rar. Hung. I (1802) 56; Shmal'g., Fl. II, 471; Ldb. Fl. Ross. IV, 108. — Ic.: Waldst. et Kit. Pl. rar. Hung. I, tab. 57; Gmel. Fl. Sib. I, tab. V, Figure 2, — Exs.: HFR No. 1091.

Perennial, 6–12 cm tall; rhizome stout, creeping, branched, the upper part covered with fibrous vestiges of leaf sheaths; stem erect, to 8 cm long, bearing 2 or 3 flowers and terminating in a 2-flowered inflorescence; radical leaves in clusters of 3 or 4, enclosed at base in bladeless membranous sheaths, about equaling or exceeding the stem (including flowers), linear or lance-linear; pedicels very short; flowers 2, yellow; spathe valves 3, elliptic-lanceolate, acute, folded and slightly inflated; perianth tube enlarged upward, about the length of ovary, one-third to two-fifths as long as the segments; limb of outer segments obovate to oblong-obovate, round-tipped, gradually narrowed into the claw, conspicuously bearded; inner segments slightly shorter and narrower than the outer; style crests obliquely oblong-ovate, attenuate toward apex, the margin irregularly toothed; stigmas rounded-lobulate, minutely crenulate; capsule ovaloid, pointed at both ends, the beak very short. May-June.

Steppe meadows, rocks, birch woods, and sands. — European part: M. Dnp., V.-Don, Bl.; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., Dau.; Far East: Uss., Okh. (a dubious specimen from the collections of Redovskii, without precise records). Gen. distr.: Centr. Eur., Mong., Jap.-Ch. Described from Transbaikalia. Type unknown.

Note: The plants described by Pallas from Siberia and by Waldstein and Kitaibel from Hungary, are not fully uniform. According to more recent investigations of K.A. Ugrinskii, Die Gesammtart Iris flavissima Pall. in Fedde Répert. spec. nov. Béihefte, XIV (1922), there are forms that can be distinguished within the form cycle I. flavissima sensu lato, such as subsp. stolonifera Ugr. (I. arenaria W.K.) f. occidentalis Ugr. (Hungary), f. orientalis Ugr. (Ukraine, Kursk, Orel, Saratov), and subsp. transuralensis Ugr. (I. flavissima s. str.), from Orenburg to Transbaikalia, Khanka and Okhotsk.

44. I. pumila L. Sp. pl. ed. I (1753) 38; Ldb. Fl. Ross. IV, 104; Shmal'g., Fl. II, 470; Boiss. Fl. or. V, 133; Dykes Iris, 142. —

546 I. aequiloba Ldb. Ind. sem. h. Dorpat. (1823) 4; Ldb. l.c. 104.— I. diantha C. Koch in Linnaea XXI, 637; Ldb. l.c. 103.— I. taurica Loddiger Bot. Cab. 1930, tab. 1506; Shmal'g., Fl. II, 471. — Ic.: Bot. Mag. tab. 9, t. 1209, t. 1261; Rchb. lc. Fl. Germ. tab. 327, Figures 752, 753, tab. 328, Figures 754, 755; Dykes Iris. pl. XXXII. Exs.: HFR No. 1138.

Perennial, 10–15 cm tall; rhizome branched; stolons bunched; stem obsolescent, sometimes up to 12 cm long (var. elongata Lipsky); scape bearing a solitary flower; leaves all radical, glaucescent, broadly linear, to 10 cm long and 12 mm broad, leaves developing after flowering twice as broad; spathe valves narrow, green, coriaceous only at apex; the inner valve membranous; flower sessile, yellow or lilac, a second mostly abortive flower sometimes present; perianth tube to 48 mm long, with 3 purple stripes; limb of outer segments orbicular or oblong, cuneate at base; inner segments about as long as but broader than the outer, oblong, emarginate, rarely as broad as the outer segments (var. aequiloba Ldb.); style branches almost colorless at margins, the keel bluish-purple (in a lilac-flowered form); style crests triangular, the upper margin toothed; capsule 3-angled, pointed at the top, sessile or nearly so; seeds small, globose. April-May. (Plate XXXIV, Figure 3).

Stony slopes and steppes, rarely on solonchaks (var. aequiloba Ldb.).

European part: M. Dnp., V.-Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., E. Transc. Gen. distr.: Centr. Eur., Med., Bal.-As. Min. Described from Hungary. Type in London.

Note. Prodan (Die Irisarten Rumäniens in Bull. Grad. Bot. Univ. Cluj, XIV (1934) 105–198) maintains that I. pumila L. occurs only in Transylvania and that all the related forms are distinct species or subspecies.

45. I. **Timofejewi** Woron., Not. Syst. Herb. H.B.P. V (1924) 62; Grossh., Fl. Kavk. I (1928) No. 1954.

Perennial, 10–20 cm tall; rhizome stout, branched; scape monanthous;
549 leaves all radical, strongly glaucous, falcate, rather narrowly linear, ca. 5–6 mm broad; spathe valves acute, sharply carinate, greatly exceeding the perianth tube; pedicel short; flower solitary; perianth tube 4–5 times the length of ovary; limb of outer segments obovate, violet, the yellow claw bearded, whitish and yellow; inner segments oblanceolate-oblong, gradually narrowed toward base, round-tipped or slightly emarginate, about as long as outer segments; style branches as long as the outer segments. (Plate XXXIV, Figure 13).

Dry slopes in the middle mountain zone. — Caucasus: Dag. Endemic. Described from Dagestan. Type unknown.

46. I. **Potanini** Maxim. in Bull. Acad. Petersb. XXVI (1880) 528; Dykes Iris, 154; Kryl., Fl. Zap. Sib. III, 668. — I. flavissima var. rupestris Ege in Ldb. Fl. Alt. I (1829) 60. — I. pumila Pall. Reise III (1776) 715.

Perennial, 10–15 cm tall; rhizome short, rather slender, with ropy root fibers; stem and leaf clusters covered at base with fibrous leaf vestiges; stem to 7 mm long; radical leaves clustered, pale green, about equaling or slightly exceeding the flowering stem, narrowly linear, acute, to 15 cm long; cauline leaves 2 or 3, with membranous sheath and linear-subulate blade; spathe valves membranous, whitish, the somewhat broader

Plate XXXIV

1. Iris Alberti Rgl.– 2. I. Hoogtiana Dykes.– 3. I. pumila L.– 4. I. Winogradowi Fom.– 5. I. Kolpakowskiana Rgl.– 6. I. tigridia Rgl.– 7. I. maricoides Rgl.– 8. I. stolonifera Maxim.– 9. I. imbricata Lindl.– 10. I. longiscapa Ldb.– 11. I. aphylla L.– 12. I. Potanini Maxim.– 13. I. Timofejewi Woron.

outer valve elliptic-lanceolate, the inner lanceolate; flower solitary, terminal; perianth tube long, slender, subfiliform, enlarged upward, as long as or longer than the segments; outer segments bearded, the obovate round-tipped limb gradually narrowed into the claw; inner segments about as long as but slightly narrower than the inner, sharply notched at apex; style crests oblong, crenate; stigmas rounded, sometimes slightly emarginate. May-July, (Plate XXXIV, Figure 12).

Valleys of desert mountain streams; gravelly slopes of hills and mountains. — W. Siberia: Alt.; E. Siberia: Dau. Gen. distr.: Mong. Described from Transbaikalia. Type in Leningrad.

47. **I. tigridia** Bge in Ldb. Fl. Alt. I (1829) 60; Ldb. Fl. Ross. IV, 104; Kryl., Fl. Zap. Sib. III, 668, No. 550; Dykes Iris, 153; Turcz. Fl. Baic.-Dah. II, 2, 198. — Ic.: Ldb. Ic. Fl. Ross. IV, t. 342.

Perennial, 10–20 cm tall; rhizome creeping or ascending; stem to 7 cm long, erect, bearing a solitary flower, covered at base with fibrous vestiges of leaf sheaths; radical leaves clustered, glaucescent, linear, long-acuminate, commonly exceeding or equaling the stem including flower;
550 spathe valves 2, membranous, slightly colored, broadly lanceolate, acute, conduplicate; flower solitary, reddish-violet, veined with violet; pedicel very short; limb of outer segments obovate, commonly somewhat emarginate, narrowed into the claw; inner segments slightly shorter than but not differing in color from the outer; style crests obliquely oblong-ovate, attenuate and toothed toward apex; stigmas rounded, crenate. April-May. (Plate XXXIV, Figure 6).

Gravelly hill slopes and sandy places in steppes. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau., Lena-Kol. (?). Gen. distr.: Mong. Described from Altai. Type in Leningrad.

48. **I. Bloudowi** Ldb. Icon. pl. Fl. Ross. II (1830) tab. 101; Ldb. Fl. Alt. IV (1833) 331; Ldb. Fl. Ross. IV, 102; Kryl., Fl. Zap. Sib. III, No. 552; Turcz. Fl. Baic.-Dah. II, 2, 197; Dykes Iris, 138. — I. flavissima var. umbrosa Bge in Ldb. Fl. Alt. I (1829) 58. — Ic.: Ldb. Ic. pl. fl. Ross. II, tab. 101.

Perennial, 15–25 cm tall; rhizome stout, creeping, branched, the upper part covered with short brown fibers; stem to 30 cm long, terminating in a 2-flowered inflorescence and bearing 2–4 leaves; radical leaves clustered, surrounded at base by membranous sheaths, about equaling or slightly exceeding the stem including flowers, broadly linear or lance-linear, short-acuminate, inflated, hyaline-margined; pedicels short or up to 15–20 mm long; perianth tube as long as ovary and 3–4 times the length of the segments; limb of outer segments obovate, slightly emarginate, yellow, bearded, gradually narrowed into the distinctly violet-veined claw; inner segments shorter and narrower than the outer; style crests narrowed upward, the margin irregularly toothed; capsule ovaloid, 6-angled, pointed at both ends. May-June.

Mountains in the lower alpine zone and alpine meadows; lower down, meadows and slopes in the timber zone, wood margins, and valleys of mountain streams. — W. Siberia: Alt.; E. Siberia: Yen., Ang.-Say., Dau., Far East: Uss.; Centr. Asia: Dzu.-Tarb., T. Sh. Gen. distr.: Kash., Mong. Described from Altai. Type in Leningrad.

49. **I. scariosa** Willd. ex Link in Spreng, Schrad. u. Link., Jahrb. I (1820) 371; Ldb. Fl. Ross. IV, 304; Kryl., Fl. Zap. Sib. III; No. 553; Dykes Iris, 178. — I. glaucescens Bge in Ldb. Fl. Alt. (1829) 58; Ldb. Fl. Ross. IV, 102. — I. pumila var. scariosa Shmalh., Shmal'g., Fl. II (1897) 470. — Ic.: Ldb. Ic. pl. fl. Ross. II, tab. 102 (sub nom. I. glaucescens Bge).

551 Perennial, 10–20 cm tall; rhizome creeping, covered at the top with short brownish fibers; stem to 15 cm long, bearing 3 or 4 leaves and terminating in a 2-flowered inflorescence; radical leaves commonly clustered, covered at base with membranous sheaths, broadly linear to sublanceolate, falcate, about as long as the stem including flowers; spathe valves membranous, commonly lilac, elliptic-lanceolate, acuminate, conduplicate; inflorescence 2-flowered; flowers lilac, short-pediceled or sessile; perianth tube 2–3 times the length of ovary, about as long as the segments, slightly enlarged upward; limb of outer segments oblong-obovate, obtuse, gradually narrowed into the claw, white-bearded at base; inner segments as long as but slightly narrower than the outer; style crests elongate, acuminate, often crenate; stigmas crenate; capsule oblong-ellipsoid, 6-angled, pointed at both ends. April-May.

Solonetz spots and stony soil in steppes; also stony slopes of low mountains. — W. Siberia: U. Tob., Irt., Alt. Centr. Asia: Balkh., Dzu.-Tarb. Gen. distr.: Dzu.-Kash., Mong., near the USSR border. Described from Siberia. Type in Berlin.

50. **I. aphylla** L. Sp. pl. ed. I (1753) 38; Dykes Iris, 157. — I. nudicaulis Lam. Encycl. III (1789) 296; Shmal'g. Fl. II, 470. — I. bohemica P.W. Schmidt, Fl. Boehm. Cent. IV, (1794) 5; Ldb. Fl. Ross. IV, 101. — I. hungarica Waldst. et Kit. Pl. rar. Hung. III, 251. — I. furcata M.B. Cent. rar. ross. ad. tab. LI (1832–42); Ldb. Fl. Ross. IV (103). — Ic.: M.B. l.c. tab. 51.

Perennial, 30–50 cm tall; rhizome short, creeping; stem firm, to 50 cm long including flowers, commonly branched somewhat above the base; flowers solitary at ends of branches; leaves often in radical clusters, broadly linear-ensiform, equaling or slightly exceeding the stem including flowers; cauline leaves few, successively decreasing in size; spathe valves ovate to oblong, inflated, herbaceous, green, often purple-veined; flowers short-pediceled or subsessile, bright violet; perianth tube commonly twice the length of ovary; limb of outer segments obovate, gradually narrowed into the claw; inner segments not differing in color from the outer, sometimes somewhat paler, the limb abruptly narrowed into the claw; style crests short-lanceolate, acute, toothed; capsule oblong, 3-angled. May-June. (Plate XXXIV, Figure 11).

Steppes. — Caucasus: Cisc., Dag., E. Transc.; European part: U. Dnp.; M. Dnp., V.-Don, Transv., Bl., L. Don. Gen. distr.: Centr. Eur., Bal.-As. Min. Type in London.

552 51. **I. variegata** L. Sp. pl. ed. I (1753) 38; Dykes Iris, 159; Shmal'g., Fl. II, 471. — Ic.: Bot. Mag. t. 16; Rchb. Ic. fl. Germ. IX, t. CCCXXIV, Figure 761.

Perennial, 40–50 cm tall; rhizome stout; stem erect, to 50 cm long, branched in upper part, the branches bearing compact terminal

inflorescences; radical leaves broadly ensiform to linear-ensiform; not exceeding half the length of stem; spathe valves herbaceous throughout at anthesis, oblong-lanceolate to oblong, strongly inflated, abruptly attenuate to an acute apex, the upper valves sometimes obtusish; flowers very short-pediceled or subsessile; limb of outer segments oblong-obovate, round-tipped or emarginate, yellowish-white, with numerous bright brownish or dark purple veins, yellow-bearded; inner segments about as long as the outer, bright golden-yellow, veinless or with few veins merely at base; style crests rather broad, strongly or faintly toothed; capsule oblong. May-June.

Coppices and woods on slopes; also stony places. — European part: possibly Bl. and M. Dnp. **Gen. distr.**: Centr. Eur., Balk. Described from Hungary. Type in London.

52. **I. imbricata** Lindl. Botan. Reg. (1845) 35; Dykes Iris p. 179. — I. sulphurea C. Koch. ex K. Koch in Linnaea XXI (1848) 637; Ldb. Fl. Ross. IV, 101. — I. flavescens Sweet in Ornament. Fl. Gard. (1854) 252. — I. sambucina Ldb. Fl. Ross. IV, 101, non L. — I. Talischii Foster in Bot. Mag. tab. 7701 (1900). — I. talyschi Foster in Grossg., Fl. Kavk. I (1928) 256. — Ic.: Bot. Mag. (1900) tab. 7701 sub nom. I. obtusifolia Bak. — Exs.: Herb. Fl. cauc. No. 116.

Perennial, 40–50 cm tall; rhizome short; stem to 50 cm long; inflorescence compact, terminal, its lateral branches apparently subsessile before flowering; leaves broadly ensiform, pale yellowish-green, the outer leaves in each leaf cluster commonly obtuse; spathe valves strongly inflated, navicular, pale green, membranous, scarcely coriaceous-margined; the outer valves sharply carinate; pedicels very short; perianth tube ca. 25 mm long, bright green with purplish-brown spots; limb of outer segments obovate, cuneate at base, greenish-yellow, the claw and sometimes the limb veined with brownish-purple, the ridge consisting of dense white bright-orange-tipped hairs; inner segments the same color as the outer, the rounded-oblong limb abruptly narrowed into the claw, this spotted with reddish-brown; style branches very broad, pale yellow, translucent, carinate; crests subquadrate, the margins serrate; stigmas entire, oblong;
553 filaments colorless or yellowish; anthers white or pale yellow; capsule cylindric, gradually attenuate at both ends; seeds compressed, with a small white aril. June. (Plate XXXIV, Figure 9).

Wet meadows. — Caucasus: E. Transc., Tal. S. Transc. **Gen. distr.**: Arm.-Kurd. Described from a garden specimen. Type unknown.

53. **I. germanica** L. Sp. pl. ed. I (1753) 38; Ldb. Fl. Ross. IV, 100; Shmal'g., Fl. II, 471; Boiss. Fl. Or. V, 137; Dykes Iris, 162. — Ic.: Bot. Mag. t. 670; Rchb. Ic. Fl. Germ. IX, t. CCCXXXVIII, Figure 765.

Perennial, 40–100 cm tall; rhizome compact, short-creeping; stem firm, or [?] strongly branched somewhat above the base, the branches terminating in dense flower clusters; leaves grayish-green, the radical broad, acuminate, the cauline smaller; spathe valves oblong, navicular, dry coriaceous above the middle; flowers short-pediceled or subsessile, with a powerful and agreable scent, varying greatly in color; perianth tube slightly longer than ovary; limb of outer segments broadly obovate, commonly dark violet, the yellowish-white claw brown-veined,

yellow-bearded; inner segments rounded-obovate, abruptly narrowed into the claw, a paler violet; filaments commonly as long as anthers; style branches enlarged upward; crests divaricate; capsule large, oblong-ovaloid. May-June.

Grown in gardens and parks for its beautiful flowers, sometimes naturalized; the naturalized plants occasionally recorded as wild-growing. — European part: U.V.; V.-Don, Transv., Bl., Crim., L. Don. Gen. distr.: Centr. Eur., Med., Bal.-As. Min; also reported for Canary Islands and S. Arabia. Described from mountainous Germany. Type in London.

54. I. **Alberti** Rgl. in A.H.P. V (1877) 260; Dykes Iris, 181. — Ic.: Gartenflora (1880) tab. 999; Bot. Mag. (1888) t. 7020.

Perennial, 30–40 cm tall; rhizome short; stem to 40 cm long; terminating in a 3-flowered inflorescence, each of the 2 or 3 branches also bearing 1–3 flowers; leaves broad, erect, glaucescent, slightly rounded at apex, commonly suffused with purple at base; spathe valves green, slightly inflated (but not navicular as in I. imbricata), the margins only slightly coriaceous in flower; pedicels very short; perianth tube ca. 12 mm long, greenish, slightly enlarged upward; limb of outer segments obovate, cuneate at base, commonly purplish-violet, the reddish-brown-veined claw separated from the limb by a line; inner segments suborbicular, the same color as the outer, the limb abruptly narrowed into
554 the yellowish claw; style branches broad, the same color as perianth segments, crests short, subquadrate, overlapping, spreading, the upper margin serrate-crenate; stigmas broad, oblong; filaments whitish; capsule short, broad, subglobose, not distinctly angled; seeds hemispherical. May. (Plate XXXIV, Figure 1).

Mixed-grass steppes in foothills. — Centr. Asia: T. Sh. Endemic. Described from vicinity of Alma-Ata. Type in Leningrad.

Section **XIPHION** Bak. in Journ. Linn. Soc. XVI (1877) 122. — Xiphion Medik. Phil. Bot. I (1789) 173. — Diaphane Salisb. in Trans. Hort. Soc., London I (1812) 305. — Rootstock a bulb, hyaline-coriaceous coats not separating into reticulate fibers; inner perianth segments broad, erect; stamens not adhering to style branches.

55. I. **Winkleri** Rgl. in A.H.P. VIII (1884) 677.

Perennial, 10–20 cm tall; bulb covered with brown membranes not separating into fibers; stem obsolete; scape monanthous; leaves 3 or 4, all radical, enclosed at base in a common membranous sheath, falcate, linear-filiform, 1–2 mm broad; spathe valves acuminate, green; pedicel ca. 1 cm long; outer segment lanceolate, bluish-violet; inner segments oblong, slightly broader than the outer; style crests oblong. June.

High-mountain zone, at altitudes from 3000 to 4000 m. — Centr. Asia: T. Sh. Endemic. Described from Yassy Pass in Fergana Range. Type in Leningrad.

Section **RETICULATAE** Dykes, Iris, 220. — Rootstock a bulb, its coats netted-fibrous; stems rather short; leaves filiform or narrowly linear.

1. Flowers pale yellow . . . . . 56. I. Winogradowi Fom.
+ Flowers azure or violet . . . . . 2.
2. Leaves tubular-filiform, with four small ribs . . . . . 3.
+ Leaves narrowly linear, with thickened margins . . . . . 59. I. Kolpakowskiana Rgl.
3. Flowers bright violet; adventitious bulbs none. . . 57. I. reticulata M.B.
+ Flowers sky-blue, the outer segments with a yellow band; adventitious bulbs numerous . . . . . 58. I. hyrcana Woron.

56. I. Winogradowi Fom. in Schedae ad Herb. Fl. Cauc. No. 166. — Exs.: l.c. No. 166.

Perennial, 10–20 cm tall; bulb globose, covered with netted-fibrous
555 coats; stem obsolete; scape monanthous; leaves all radical, quadrangular; spathe valves lanceolate; flowers pale yellow; limb of outer segments one-third as long as the claw, the median line dark-dotted; inner segments equaling the outer, broadly oblanceolate, obtuse, erect; style branches broadly linear, shorter than perianth segments. (Plate XXXIV, Figure 4).

Subalpine zone. — Caucasus: W. Transc., mountains above Gagra; E. Transc.: Mount Lomis-mta. Endemic. Described from Adzhar-Imeretian Range, Mount Lomis-mta. Type in Tiflis.

57. **I. reticulata** M.B. Fl. taur.-cauc. (1808) 34; Ldb. Fl. Ross. IV, 93; Boiss. Fl. Or. V, 120; Dykes Iris, 22; Shmal'g., Fl. II, 469. — Ic.: M.B. Cent. pl. rar. I, t. 11; Gartenflora (1864) tab. 452 and (1873) tab. 779. — Exs.: Herb. Fl. cauc. No. 63; Pl. or. exs. No. 59.

Perennial, 25–35 cm tall; bulb globose, to 25 mm in diameter, the whitish coats regularly netted-fibrous; stem obsolescent; scape monanthous; leaves 2–4 on each bulb, nearly all radical, to 30 cm long at anthesis, quadrangular, narrowly linear, the sides unequal in cross section, the ribs near apex subcorneous, each leaf arising from 2 almost colorless sheaths; spathe valves narrow, clasping the perianth tube, with split margin; perianth tube not longer than the spathe at anthesis, but greatly exceeding it within a day or two; pedicel initially very short, elongating to 6–7 cm after flowering; perianth tube to 7–12 cm long, violet, with 6 darker stripes; limb of outer segments broadly banded bright yellow and dark-dotted along the median line, oblong-pandurate, the channeled claw 3–4 times as long as the limb; inner segments oblanceolate, obtuse, erect, as long as or more often slightly longer than the outer segments; style branches about equaling the perianth segments, with nearly parallel margins; crests long, triangular, remotely serrate; capsule cylindric, 3–4 times as long as broad, narrowed at both ends; seeds when fresh consisting of two spherical portions, white and brown, separated by a slight constriction, in drying the white portion diminishing greatly in size. April. (Plate XXXIII, Figure 3).

Hills, steppes, and coppices. — Caucasus: Cisc. (?), Dag. (?), S. and E. Transc. Gen. distr.: Bal.-As. Min., Arm.-Kurd. Described from Iberiya (Transc.). Type in Leningrad.

Economic importance. Many varieties of this early spring-blooming plant are grown in gardens for the beautiful flowers.

58. **I. hyrcana** Woron. in Grossg., Fl. Kavk. I (1928) No. 1026.

556 Perennial, 10–25 cm tall; bulb globose, to 25 mm in diameter, with coats consisting of a net of parallel fibers and surrounded by numerous bulbils; stem obsolescent; scape monanthous; leaves all radical, 2–4 on each bulb, to 25 cm long at anthesis, quadrangular, narrowly linear, the basal sheaths not united and clasping each leaf in pairs; spathe valves narrow, enveloping the perianth tube; pedicel initially very short, finally much elongated; perianth tube long; outer segments sky-blue with a yellow band and dark spots; inner segments sky-blue; style branches about equaling the perianth segments; crests oblong, remotely serrate. April. (Plate XXXIII, Figure 4).

Hills.— Caucasus: Tal., E. Transc. Endemic. Described from Lenkoran. Type unknown.

59. **I. Kolpakowskiana** Rgl. in A.H.P. V (1877) 263; Dykes Iris, 228.— Ic.: Gartenflora tab. 939; Bot. Mag, (1880) t. 6489 sub nom. Xiphion Kolpakowskiana Baker.— Exs.: H.F.A.M. No. 421, 1a, b.

Perennial, 15–25 cm tall; bulb densely covered with reticulate leaf vestiges; stem obsolete; scape monanthous; leaves 3 or 4, all radical, surrounded at base by a common membranous sheath; sheath ca. 5 cm long at anthesis, linear-filiform, ribbed; spathe valves acuminate, green; pedicel 1–2 cm long; perianth tube 5–7.5 cm long; outer segments lanceolate, the outer face greenish-yellow tinged with purple, the inner face of the limb reddish-purple veined with darker purple at apex, milky white with a bright yellow ridge at base, the claw yellow on both sides of the crest; inner segments oblong, plain pale purple; style branches pale purple; crests narrow, acuminate; stigmas entire. April-May. (Plate XXXIV, Figure 5).

Grassy and stony slopes (from the foothills up to 1000 m above sea level).— Centr. Asia: T.Sh. Endemic. Described from vicinity of Alma-Ata. Type in Leningrad.

Section **GYNANDRIRIS** Benth. in Benth. et Hook, Gen. pl. III (1883) 687.— Gynandriris Parl., Nouv. gen. et spec. Monocotyl. (1859) 49.— Rootstock a corm, covered with netted-fibrous coats; stems leafy; flowers fugacious.

60. **I. maricoides** Rgl. in A.H.P. VIII (1884) 679.— I. sisyrinchium (pro parte) Dykes, Iris p. 229; O. Fedchenko in Bull. Jard. Bot. Princ. XXIII, 2 (1924) No. 72.— Ic.: Flora Turkmenii, pt. 1, Figure 114.—Exs.: Pl. turk. ed. H.B.P. No. 59 (sub nom. I. sisyrinchium).

557 Perennial, 30–60 cm tall; corm globose, the surrounding light brown membranes separating at the top into pectinate fibers; stem terete; cauline leaves commonly 2, linear, subfalcate, with prominent longitudinal veins; spathe valves lanceolate, coriaceous and somewhat inflated at anthesis; pedicels very short or the flowers sessile; flowers 2–4, at the end of the stem, faintly fragrant, fugacious, lilac or bluish-violet; perianth tube slender, ca. 2 cm long, longer than ovary; outer segments recurved, the limb with a yellow or whitish blotch at base, gradually passing into the claw, this bearing a line of hairs; inner segments erect, slightly shorter than the outer, obtuse, lanceolate; filaments as long as anthers;

style branches equaling the perianth segments; crests large, oblong-lanceolate; capsule elongate-cylindric, obtusely 3-angled; seeds small, spherical. March-April. (Plate XXXIV, Figure 7).

Semisteppes and semideserts, slopes of sandy hills, and pistachio groves. — Centr. Asia: Mtn. Turkm., especially in Kushka area; Amu Dar., only on slopes of Kugitang, Pam.-Al. along Pyandzh and near Baisun. Endemic. Described from Soviet Central Asia, near Pishpek, not uncommonly from village of Sayat on the Pyandzh (Tadzhikistan).

Section **JUNO** (Tratt.)* Boiss. Fl. Or. V (1884) 118 et auct. plur. — Juno Tratt. Auswahl. I (1821) 135.

Inner perianth segments recurved or horizontally spreading, much reduced, often almost rudimentary; outer segments destitute of hairs, the entire or dissected ridge sometimes descending from the limb right down to the base of the claw; perianth tube very long, not less than the length of perianth segments; filaments distinct; leaves channeled, 2-ranked, in most species falcate, the margin more or less cartilaginous; bulbose herbs, usually with cordlike or fusiform roots.

Note. The study of species of the section Juno, as of other Iridaceae, ought to be conducted with live material. There are some species that the author has not seen either in natural condition or in cultivation, and therefore the various descriptions presented here are by no means of equal value. In all cases where the description was based solely on herbarium material, it is necessary to approach with caution not merely the records of color but also those referring to the shape of flower parts. The consistency of such characters is subject to doubt, since even a properly dried flower (a great rarity in the herbarium) is difficult to study due to its crumpled state.

Another difficulty involved in the study of species of the Juno section is that many of the descriptions, based on cultivated specimens, are not sufficiently detailed and, more particularly, lack any indication as to the provenience of the described plants.

558 **Economic importance.** Many irises of the Juno section are ornamental flowers that have been in cultivation for a long time for their beautiful flowers. They can be found in catalogs of international florists which are anxious to supplement their stocks by imports from the USSR.

The species that may be unconditionally recommended for large-scale cultivation in the Soviet Union are I. Warleyensis, I. vicaria, I. bucharica, I. magnifica, I. Willmottiana, I. orchioides, and I. Rosenbachiana.

Other species, though unlikely to be widely accepted are nevertheless of interest to collectors of whom there are considerable numbers, e.g., in the U.S.A. Attention should therefore be given to the export of all species in the Juno section.

1. Roots slender, filiform . . . . . 87. I. leptorhiza Vved.
+ Roots more or less thickened, cordlike or fusiform . . . . . 2.
2. Leaves united at base into an amplexicaul sheath, and if the sheath occasionally short then the claw of outer perianth segments broader than the limb . . . . . 3.

* Arranged by A.I. Vvedenskii.

+ Leaves at base not united into a sheath . . . . . 7.
3. Outer perianth segments yellow; inner segments violet, obtuse, 2 cm long; seeds not arillate . . . . . 61. I. Fosteriana Aitch. et Baker.
+ Perianth segments more or less alike in color, the inner acute and 1/2–1½ cm long . . . . . 4.
4. Flowers yellow, the crest mostly entire . . . . . 5.
+ Flowers greenish or pale violet, the ridge dissected . . . . . 6.
5. Outer perianth segments 2½–3 cm long . . . . . 69. I. Vvedenskyi Nevski.
+ Outer perianth segments 3½–4 cm long . . . . 68. I. linifolia O. Fedtsch.
6. Outer perianth segments pale yellowish-green, 3–3½ cm long; leaves nearly straight, with nearly parallel margins . . . 66. I. parvula Vved.
+ Outer perianth segments pale violet, 4–4½ cm long; leaves falcate, gradually attenuate toward apex . . . . . 67. I. tadshikorum Vved.
7. Claw of outer perianth segments with nearly parallel margins, the broadest part little broader than the narrowest part, the limb commonly broader than the claw . . . . . 8.
+ Claw of outer perianth segments greatly enlarged with upturned auricles, the broadest part 2–3 times as broad as the narrowest part, the limb commonly narrower than the claw . . . . . 21.
559
8. Perianth tube 6–10 cm long; flowers usually appearing together with leaves . . . . . 9.
+ Perianth tube 3–5–(6) cm long; flowers appearing when leaves fully developed . . . . . 12.
9. Inner perianth segments acute, 4 mm broad . . . . 65. I. Popovii Vved.
+ Inner perianth segments obtuse or more often emarginate, 5–12 mm broad . . . . . 10.
10. Flowers yellow; outer perianth segments veined with violet . . . . . 62. I. baldshuanica B. Fedtsch.
+ Flowers violet or pale rose-violet, the limb of outer segments darker. . . . . 11.
11. Flowers violet; leaves attenuate at apex . . . 64. I. Rosenbachiana Rgl.
+ Flowers pale rose-violet; leaves attenuate from the middle . . . . . 63. I. Nicolai Vved.
12. Inner perianth segments linear, 5–10 mm long; seeds arillate . . . . . 13.
+ Inner perianth segments 10–35 mm long, the limb oblanceolate or rhomboidal 3-lobed . . . . . 14.
13. Flowers pale yellow; claw of outer segments with parallel margins . . . . . 85. I. drepanophylla Aitsch. et Baker.
+ Flowers greenish; claw of outer segments gradually and slightly enlarged above the middle . . . . . 86. I. kopetdaghensis Vved.
14. Stem 3–10 cm long, the internodes inconspicuous in flowering period. . . . . 15.
+ Stem (15)–20–40–(50) cm long; the internodes conspicuous at least by the end of the flowering period . . . . . 19.
15. Inner perianth segments 1–2 cm long, the limb rhomboidal 3-lobed . . 16.
+ Inner perianth segments 2–3 cm long, the limb oblanceolate . . . . . 17.
16. Flowers pale dingy green or lilac to nearly colorless, the ridge dissected . . . . . 73. I. subdecolarata Vved.
+ Flowers pale violet, the ridge undissected, crenate . . . . . 72. I. Kuschakewiczii B. Fedtsch.
17. Stem enveloped at base by 1 leafless sheath; ridge dissected . . . . . 70. I. narynensis O. Fedtsch.

+ Stem enveloped at base by 2 or 3 leafless sheaths; ridge undissected. . . . . 18.

560 18. Flowers violet; leaves gradually attenuate toward apex; roots fusiform. . . . . 71. I. Narbuti O. Fedtsch

+ Flowers azure; leaves abruptly narrowed at apex; roots cordlike. . . . . 74. I. coerulea B. Fedtsch.

19. Flowers yellow . . . . . 77. I. bucharica Foster.

+ Flowers violet . . . . . 20.

20. Limb of outer perianth segments dark violet . . . . . 76. I. warleyensis Foster.

+ Limb of outer perianth segments without a dark violet blotch . . . . . 75. I. vicaria Vved.

21. Wings on the claw of outer segments gradually passing into the limb. . . . . 22.

+ Wings on the claw steeply receding, the back part of the limb more or less narrowed . . . . . 23.

22. Flowers pale yellow . . . . . 83. I. caucasica Hoffm.

+ Flowers azure . . . . . 84. I. pseudocaucasica Grossh.

23. Flowers various shades of violet. . . . . 24.

+ Flowers various shades of yellow . . . . . 25.

24. Stem 25–40 cm long, with distinct internodes; enlarged part of the claw 2–2½ cm broad . . . . . 78. I. magnifica Vved.

+ Stem 10–20 cm long, the internodes imperceptible; enlarged part of the claw 1½ cm broad . . . . . 79. I. Willmottiana Foster

25. Flowers yellow; enlarged part of the claw 10 mm broad . . . . . 82. I. Tubergeniana Foster.

+ Flowers pale yellow; enlarged part of the claw 15–25 mm broad . . . 26.

26. Stem 10–15 cm long, the internodes imperceptible; flowers strongly scented, not changing in color at fading; ridge entire; stigmas semicircular . . . . . 81. I. maracandica Vved.

+ Stem (10) 20–(30) cm long, the internodes distinct; flowers fading to a violet shade; ridge commonly dissected . . . 80. I. orchioides Carr.

61. I. **Fosteriana** Aitch. et Baker in Trans. Linn. Soc. Ser. II, III (1888) 114. — I. caucasica var. bicolor Rgl. in A. H. P. IX (1884) 620. — Ic.: Bot. Mag. t. 7215.

Perennial; roots thickened, cordlike; bulb ca. 1½ cm in diameter, elongated, poorly developed; stem (5) 10–20 cm long, elongating in fruit; leaves approximate in flower, distant in fruit, falcate, the nearly parallel margins smooth; lower leaves 5–8 mm broad; flowers 1 (2); perianth tube 3½ cm long; outer perianth segments pale yellow, ca. 4 cm long, with parallel
561 margins, 5 mm broad, gradually enlarged into the limb; limb obovate, obtuse or emarginate, with a large dark yellow blotch, 1–1.5 cm long, the ridge entire; inner segments violet, ca. 2 cm long, the obovate obtuse limb mostly abruptly narrowed into the claw; style crests obliquely triangular, obtuse, crenate, 4–10 mm long; stigmas commonly reniform. March-April.

Gravelly slopes of the steppe mountain zone. — Centr. Asia: Mtn. Turkm. **Gen. distr.**: N. Afghanistan. Described from Badkhyz.

62. I. **baldshuanica** B. Fedtsch. in Journ. Russe Bot. (1909) 77.

Perennial; roots thickened, fusiform; bulb ca. $1\frac{1}{2}$ cm in diameter, well developed; stem obsolescent, with closely approximate leaves and imperceptible internodes; leaves developing together with flower, at anthesis greatly overtopped by the flowers, with nearly parallel margins, attenuate at apex, narrowly marginate, the margins smooth; lower leaves ca. 1 cm broad (I have not seen fully expanded leaves); flowers 2, yellow; perianth tube ca. 10 cm long; outer segments $4\frac{1}{2}$ cm long; claw with nearly parallel margins, 7 mm broad, gradually passing into the limb; limb obovate, marked with violet veins, 10–17 mm long, the ridge undissected, the margins entire; inner segments ca. 2 cm long, the obtuse or more often emarginate limb oblong-ovate, ca. 7 mm broad; style crests obliquely triangular, obtuse, crenate, 6–15 mm long; stigmas semicircular.

Centr. Asia: Pam.-Al. Endemic. Described from cultivated specimens obtained from the firm Tubergen with indication of origin from Bukhara.

63. I. Nicolai Vved. in Bull. Univers. As. Centr. 21 (1935) 151.— I. Rosenbachiana var. coerulea Rgl. Gartenfl. 35 (1886) 411?— Juno Nicolai Vved. ibid.

Perennial; roots thickened, fusiform; bulb ca. $1\frac{1}{2}$ cm in diameter, well developed; stem obsolescent, with closely approximate leaves and imperceptible internodes; leaves developing together with flowers, at anthesis greatly overtopped by the flowers, subcordate, attenuate from the middle, narrowly marginate, the margins more or less scabrous; lower leaves 1–3 cm broad; flowers 1 or 2 (3), pale rose-violet; perianth tube 8–9 cm long, dusky purple-violet; outer segments $4-4\frac{1}{2}$ cm long; claw whitish-margined, yellow veined with purple-violet at center, with nearly parallel margins, 9–10 mm broad, gradually enlarged into the claw; claw oblong, obtuse or emarginate, 10–12 by 17–20 mm, tipped dark purplish-violet, white on both sides of the ridge; ridge yellow purple-spotted, the margins entire; inner segments $3-3\frac{1}{2}$ cm long, 5–9 mm broad, the oblong oblanceolate obtuse or emarginate pale rose-violet limb gradually narrowed
562 into a darker claw; style crests obliquely triangular, obtuse to subacute, dentate-crenate, 6–8 by 18–20 mm; stigmas shortly semicircular, slightly emarginate. March-April.

Clayey slopes in the lower mountain zones, up to 2000 m. — Centr. Asia: Pam.-Al. (Chul'bair mountains, Vakhsh and Kyzyl-su river valleys). Endemic. Described from Chul'bair mountains, above Sin village. Type in Tashkent.

Note. The author saw them in natural condition in Chul'bair mountains.

64. **I. Rosenbachiana** Rgl. in A.H.P. VIII (1884) 675, t. 8.— I. Rosenbachiana var. violacea Rgl. Gartenfl. (1886) 411?— Juno Rosenbachiana Vved. in Bull. Univers. As. Centr. 21 (1935) 152.

Perennial; roots thickened, short, fusiform; bulb ca $1\frac{1}{2}$ cm in diameter, well developed; stem obsolescent; with closely approximate leaves and imperceptible internodes; leaves developing together with flowers, at anthesis commonly greatly exceeded by the flowers, subfalcate, with almost parallel margins, attenuate at apex, narrowly marginate, the margins more or less scabrous; lower leaves 2–3 cm broad; flowers (1) 2 or 3, violet;

perianth tube 9–10 cm long; outer segments (4)–5–5.5 cm long; claw with nearly parallel margins, gradually enlarged into the limb; limb 12–17 by 17–22 mm, dark violet, on both sides of the ridge white with dark violet spots; ridge undissected, with entire margins, the front part dark violet, the back part yellow (?); inner segments $2\frac{1}{2}$–3 cm long, the oblong-obovate to obovate-obtuse or often emarginate limb 6–12 mm broad; style crests obliquely triangular, subacute to obtuse, crenate-dentate, 5–10 by 15–22 mm; stigmas shortly semicircular. March-April.

Stony slopes of the lower mountain zone, up to 2000 m. — Centr. Asia: Pam.-Al.; valleys of Khingov; Yak-su and Pyandzh (east of Bal'dzhuan-Kulyab meridian) rivers. Endemic. Described from upper Ak-su. Type in Leningrad.

Note. Even after separation of I. baldshuanica, I. Nikolai and I. Popovii, the remaining herbarium material is not uniform. Further studies are possible only with live material.

65. **I. Popovii** Vved. in Bull. Univers. As. Centr. 21 (1935) 152. — Juno Popovii Vved., ibid.

Perennial; roots much thickened, fusiform; bulb ca. $1\frac{1}{2}$ cm in diameter, well developed, the outer coats papery; stem 5–10 cm long, with approximate leaves and imperceptible internodes; leaves almost fully expanded by the time of flowering, subfalcate, with nearly parallel margins, narrowly margined at apex, scabrous; lower leaves 2–2.5 cm broad; flowers 2–4, azure (? or pale violet); perianth tube 6–9 cm long; outer segments 3.5–4.5 cm long; claw with nearly parallel margins and darker veins, 6–10 mm broad, gradually enlarged into the limb; limb oboblong,
563 emarginate, yellowish (?) with violet veins, 10–15 mm long, the ridge undissected crenate; inner segments ca. 2 cm long, the obovate acute limb ca. 4 mm long, gradually passing into the claw; style crests obliquely triangular, acute, crenate, 5–13 mm long; stigmas obreniform. June.

Near melting snow, on clay soil, at altitudes about 3600 m. — Centr. Asia: Pam.-Al. Endemic. Described from Gardan-i-kaftar Pass. Type in Leningrad.

66. **I. parvula** Vved. in Herb. Fl. As. Med. (1935) No. 663. — Juno parvula Vved., ibid.

Perennial; roots much thickened, short, fusiform; bulb ca. 1 cm in diameter, well developed, the outer coats papery; stem 5 (10) cm long, with subdistant leaves and more or less distinct internodes; leaves nearly straight, very slightly recurved, with nearly parallel margins, attenuate only at apex, acute, narrowly marginate, the margin scaberulous; lower leaves 5–8–(15) mm broad; flowers 1 or 2–(5), pale yellowish-green; perianth tube ca. 4 cm long; bluish-green; outer segments 3–3.5 cm long; claw with parallel margins, 5 mm broad, marked with longitudinal bluish-green veins, gradually enlarged into the blade; blade oblong to oblong-ovate, acutish to obtuse, 6–8 by 10–12 mm, with dingy green veins and dingy yellow spots on both sides of the pale yellowish-green dissected ridge; inner segments ca. 5 mm long, acute, 3-lobed; style crests obliquely triangular, acute, entire, 3 by 5 mm; stigmas obreniform. May-June.

Fine-textured stony slopes in the upper mountain zone, at altitudes of 2500–3000 m. — Centr. Asia: Pam.-Al. (Gissar and Zeravshan ranges).

Endemic. Described from Chul'bair mountains near Sin village. Type in Tashkent.

Note. The author saw this species in natural state in Chul'bair mountains. From the upper Mogian-darya to Tash-kurgan in the southwest, one comes across specimens with falcate gradually attenuate leaves that do not apparently differ in flower color from the described species. Very similar to these are specimens collected in Basmandinskoe Ravine, but their flowers in dry condition make the impression of being violet. The plant material is unsufficient for definite determination.

67. **I. tadshikorum** Vved. in Bull. Univers. As. Centr. 21 (1935) 152.— Juno tadshikorum Vved., ibid.

Perennial; roots much thickened, fusiform; bulb 1.5–2 cm in diameter, well developed, the outer coats papery; stem ca. 5 cm long, with approximate leaves and imperceptible internodes; leaves subfalcate, gradually attenuate, marginate, the margin scaberulous or smooth; lower leaves (6)–10 cm broad; flowers (1) 2–4, pale violet (?); perianth tube 3.5–4 cm long; outer segments 4–4.5 cm long; claw with nearly parallel
564 margins, 7–8 mm broad, gradually enlarged into the blade; blade acutish or emarginate, obovate, 12 by 15 mm, the ridge white dissected; inner segments ca. 1.5 cm long, acute, obtusely 3-lobed; style crests obliquely triangular, obtuse, crenate, 5 by 12 mm; stigmas obreniform. June.

Stony slopes in the upper mountain zone, about 2500 m.— Centr. Asia: Pam.Al. (Darvaz). Endemic. Described from the area between Sarydash and Tavil'dara. Type in Leningrad.

68. **I. linifolia** O. Fedtsch., Bull. Jard. Bot. Imp. St.Pétersb. V (1905) 159 —Iris caucasica var. linofolia Rgl. A.H.P. VIII (1884) 678.—Juno linifolia Vved. in Bull. Univers. As. Centr. 21 (1935) 152.

Perennial; roots much thickened, short, fusiform; bulb ca. 1 cm in diameter, well developed, the outer coats papery; stem 5–10 cm long, slender, with subdistant leaves and more or less distinct internodes; leaves subfalcate, gradually attenuate, marginate, the margin smooth or scabrous; lower leaves 4–7 mm broad; flowers 1 (2), pale yellow; perianth tube ca. 4 cm long; outer segments 3.5–(4) cm long; claw with nearly parallel margins, ca. 6 mm broad, gradually enlarged into the limb; limb obtuse or shortly emarginate, broadly oblong, darker than the claw, 9–12 by 12–15 mm; ridge white (?), undissected, crenate, more conspicuously so in the back part, very rarely dissected; inner segments ca. 1 cm long, acute, obtusely 3-lobed; style crests obliquely triangular, obtuse, entire, 5 by 11 mm; stigmas obcordate. May-June.

Stony and gravelly slopes in the upper mountain zone (about 2500 m).— Centr. Asia: T. Sh., Ab-Yaza and Kendyr-auz passes; Pam.-Al.: Alai Range. Endemic. Described from Kendyr-auz Pass. Type in Leningrad.

69. **I. Vvedenskyi** Nevski in Fl. Turkm. (1932) 323.

Perennial; roots much thickened, fusiform; bulb ca. 1 cm in diameter, well developed, the outer coats papery; stem 3–5 cm long, with subdistant leaves and more or less distinct internodes; leaves falcate, gradually attenuate toward apex, prominently veined, marginate, the margin scaberulous; lower leaves 4–5 mm broad; flowers 1 (2), pale yellow;

(565)

Plate XXXV

1. Iris magnifica Vved., a) style branch, b) outer perianth segments, c) inner perianth segment.

perianth tube 2.5–3 cm long; outer segments 2.5–3 cm long; claw with nearly parallel margins, ca. 5 mm broad, gradually enlarged into the limb; limb darker, obovate, obtuse, 7 by 12 mm, the undissected crest orange crenate; inner segments ca. 6 mm long, acute, sublinear or obtusely 3-lobed; style crests obliquely triangular, acutish, 2 by 7 mm, the margins entire; stigmas obcordate. May.

567 Centr. Asia: Pam.-Al. (Kugitang). Described from Kugitang mountains, above Khodzha-fil''-ata. Type in Leningrad

70. I. narynensis O. Fedtsch. in Bull. Jard. Bot. St. Pétersbg. (1905) 159.

Perennial; roots much thickened, short, fusiform; bulb ca. 1.5 cm in diameter, well developed; stem ca. 5 cm long, with approximate leaves and imperceptible internodes; leaves falcate, gradually attenuate toward apex, marginate, the margin more or less rough-ciliate; lower leaves 5–10 mm broad; flowers 1 (2), pale violet; perianth tube 4.5–5 cm long; outer segments ca. 4 cm long; claw slightly enlarged in upper part (ca. 8 mm), with nearly parallel margins; limb acutish or obtuse, 9 by 10 mm, dark violet except for the margins, the white ridge dissected; inner segments ca. 2 cm long, linear-oblanceolate, gradually narrowed toward base, acute to obtuse; style crests obliquely triangular, acutish, 4 by 10 mm, the margins entire; stigmas semicircular. March-April.

Gravelly slopes in the lower mountain zone. — Centr. Asia: T. Sh. (Namangan, Naryn River valley). Endemic. Described from Naryn River valley. Type in Leningrad.

71. I. Narbuti O. Fedtsch. in Izv. O-va Lyub. Est., Antr. i Etn. CIII (1902) 147. — I. caucasica var. oculata Maxim., A. H. P. VI (1880) 497 p.p. — I. dengerensis B. Fedtsch. in Bull. Jard. Bot. St. Pétersb. V (1905) 157. — I. hissarica O. Fedtsch. in Ö. B. Z. (1905) 157. — Ic.: Bull. Jard. Bot. Pétersb. V (1905) 158.

Perennial; roots thickened, fusiform; bulb ca. 2 cm in dimater, well developed; stem 5–10 cm long, with closely approximate leaves, the internodes sometimes perceptible in fruit; leaves dark green, falcate, gradually attenuate toward apex, broadly margined, the margin smooth or very rarely scabrous; lower leaves 5–25 mm broad; flowers 1 or 2–(6), inodorous; perianth tube gradually enlarged upward, greenish, violet-tinged, 4–5 cm long; outer segments 3.5–4–(5) cm long; claw pale violet or yellowish with greenish-yellow median part and violet lateral veins, 4–7 mm broad, gradually enlarged into the limb, the lateral veins prolonged onto the limb; limb obovate, emarginate, 7–12 by 9–16 mm, a dark violet velvety blotch varying in size and sometimes broken up, the dark blotch surrounding a dark yellow or rarely pale yellow spot situated on both sides of the white undissected sometimes crenate ridge; inner segments 2.5–3.5 cm long, violet, with few darker veins, the oblanceolate or obovate acutish or obtusish or emarginate and often crenate limb gradually narrowed
568 into the claw; style branches pale violet or very often dingy yellow; style crests narrow, obliquely triangular, acutish, 4–5 by 11–12 mm, the margins entire; stigmas elongate-semicircular; anthers whitish or often azure; pollen whitish. March-April.

Rocky and gravelly slopes in the foothills. — Centr. Asia: Syr D.: Tashkent area, Dal'verzinskaya Steppe; Pam.-Al.: Dzhizak, Mirshade, Dengora. Endemic. Described from the surroundings of Samarkand and Tashkent. Type in Leningrad.

Note. The author saw wild-growing plants in the vicinity of Tashkent and Dzhizak and cultivated specimens from Samarkand and from the Baisun area. Plants from West Tien Shan are distinguished by paler color (the blotch on the limb of outer perianth segments less developed and sometimes nearly absent) and very likely should be separated as a distinct species.

72. **I. Kuschakewiczii** B. Fedtsch. in Bull. Jard. Pétersb. V (1903) 158. — I. caucasica var. oculata Maxim., A.H.P. (1880) 497, p.p.

Perennial; roots thickened, cordlike; bulb ca. 1.5 cm in diameter, well developed; stem ca. 3 cm long, with quite imperceptible internodes; leaves 4 or 5, closely approximate, dark green, gradually attenuate toward apex, broadly marginate, the margin scabrous; lower leaves 1–1.5 cm broad; flowers 1–3 (4), pale violet, inodorous; perianth tube 3.5–4.5 cm long; outer segments 3.5–4 cm long; claw slightly enlarged above the middle (up to 1 cm), constricted below the limb (ca. 0.5 cm), the 5 dark violet interrupted veins prolonged onto the limb; limb oblong-obovate, 7 by 12 mm, white or faintly lilac-margined, the dark violet blotch overflowing onto the front part of the ridge; ridge white, undissected, crenate, or very rarely dissected and then not down to base; inner segments 1–1.5 cm long, the limb 3-lobed acute; style crests obliquely triangular, acutish, 4 by 10 mm, the margins entire; stigmas semicircular; anthers whitish. April-May.

Gravelly slopes in the foothills. — Centr. Asia: T.Sh. In the foothills, along the northern periphery from Malyi Burul (Aulie-ata) to Zaitsevka (Alma Ata). Type in Leningrad.

Note. The author saw the plants cultivated in the vicinity of Samsonovka and Sarybas-tau.

73. **I. subdecolorata** Vved. in Opred. rast. okr. Tashkenta I (1923) 75, Figure 105.

Perennial; roots thickened, cordlike; bulb ca. 1.5 cm in diameter, well developed; stem ca. 3 cm long, the internodes imperceptible even in fruit; leaves 4–6, closely approximate, dark green, falcate, gradually attenuate toward apex, broadly marginate, the margin rough-ciliate; lower leaves 8–20 mm broad; flowers 1–3, pale dingy green or lilac-tinged, transparent, nearly colorless, inodorous; perianth tube ca. 4.5 cm long; outer segments
569 4–4.5 cm long; claw slightly enlarged above the middle, 7–9 mm broad, slightly constricted below the limb, 5–6 mm broad, often the breadth of the limb, the 2 dingy violet longitudinal sometimes interrupted veins prolonged onto the limb; limb oblong to oblong-obovate, round-tipped, 7–10 by 14–16 mm, with dingy green diffuse spots on both sides of the ridge; ridge white, dissected, sometimes nearly reaching the base of the claw; inner segments 15–20 mm long, the limb acute rhomboidal or often 3-lobed; style crests obliquely triangular, acutish, 4×11–13 mm, the margins entire; stigmas semicircular; anthers and pollen whitish; filaments azure. March-April.

Loess foothills. — Centr. Asia: Syr D., vicinity of Tashkent. Described from the vicinity of Tashkent. Type in Tashkent.

Note. The author saw the plants in natural condition in the vicinity of Tashkent. A species closely related to the preceding one.

74. **I. coerulea** B. Fedtsch. in Bull. Herb. Boiss. IV (1904) 917.

Perennial; roots thickened, cordlike; bulb 2–2.5 cm in diameter, well developed; stem 5–7 cm long, with closely approximate leaves and imperceptible internodes; leaves falcate, ca. 10 cm long, abruptly narrowed toward apex, broadly marginate; the margin smooth or scaberulous; lower leaves (1)–2–3 cm broad; flowers (1) 2–5, azure; perianth tube ca. 4 cm long; outer segments ca. 4 cm long; claw with parallel (?) margins; limb with yellow spot on the sides of the ridge; ridge white, undissected, the margins entire; inner segments 2–2.5 cm long, oblanceolate; stigmas shortly semicircular; anthers and pollen whitish. June.

Stony clay slopes in the mountains (about 2000 m). — Centr. Asia: T. Sh., valleys of Dzhebogly-sy, Pskem and Ugam rivers; Fergana Range (?). Endemic. Described from S'emesas in Pskem River valley.

Note. The plant material from Fergana deserves supplementary study.

75. **I. vicaria** Vved. in Herb. Fl. As. Med. (1935) No. 666. — I. orchioides var. coerulea Baker., Handb. Irid. (1892) 46. — Juno vicaria Vved., ibid.

Perennial; roots thickened, fusiform; bulb ca. 2.5 cm in diameter, well developed; stem 20–40 (-50) cm long, the leaves distant at least toward the end of flowering, the internodes distinct; leaves pale green, falcate, gradually attenuate toward apex, marginate, the margin scabrous; lower leaves 1.5–4 cm broad; flowers (1) 2–4 (-8), inodorous; perianth tube 4–4.5 cm long, violet with darker veins; outer segments 4–5.5 cm long, pale violet; claw with parallel margins, 5–10 mm broad, gradually enlarged into the limb, the 4 longitudinal ramified veins dark violet; limb oblong,
570 often emarginate, 8–14 by 12–17 mm, white or yellowish, with pale violet margins, violet veins and a dark yellow spot on the sides of the ridge; ridge yellow or white, or white with yellow base, undissected, crisped; inner segments 2–2.5 cm long, violet with darker veins, the limb acute rhomboid or 3-lobed or rarely obovate obtuse or emarginate; style crests pale violet with darker veins, obliquely triangular, obtusish, 4–6 by 11–20 mm, the margins entire; stigmas semicircular, emarginate; anthers and pollen whitish. March-April.

Stony slopes and among rocks in the lower mountain zone. — Centr. Asia: Pam.-Al. (Baisun mountains, Gissar, Range, Kugitang?). Endemic. Described from Gissar Range, near Shargun. Type in Tashkent.

Note. The author saw the plants growing wild in the Gissar Range and the Chul'bair mountains, and also cultivated specimens originating from the Baisun area.

76. **I. warleyensis** Foster in Gardn. Chron. XXXI (1902) 386, f. 134. — Ic.: Flora and Sylva III (1905) 344 (dextra).

Perennial; roots only slightly thickened, fusiform; bulb ca. 2.5 cm in diameter, well developed; stem 20–40 cm long, with distant leaves and conspicuous internodes; leaves pale green, falcate, gradually attenuate

toward apex, marginate, the margin scabrous; lower leaves 1.5–3 cm broad; flowers 2–5, inodorous; perianth tube 4.5–5 cm long, greenish, faintly marked with few violet veins; outer segments 4–5.5 cm long; claw with parallel margins, 7–12 mm broad, gradually enlarged into the blade, pale violet, the midvein white, the 4–6 longitudinal lateral veins violet; limb obovate to oblong, often emarginate, 1–1.5 by 1.4–2 cm, velvety violet with white margin and a dark yellow blotch on the sides on the ridge; ridge white, yellow at base, sometimes (in dark colored specimens) violet-tinged, undissected, crenate; inner segments 12–20 mm long, violet with darker veins, acute, obstusely 3-lobed; style crests obliquely triangular, pale violet, acutish, 4–7 by 1–1.5 cm, the margins entire; stigmas semicircular, emarginate; anthers and pollen whitish. March-April.

Stony slopes in the lower mountain zone. — Centr. Asia: Pam.-Al. (W. part: Samarkand mountains to Mogian-darya, Shakhrisyab, Derbent). Endemic. Described from cultivated specimens without precise indication of provenience. Dykes (Iris, 204) mentions Bukhara and lists various locations unknown to the author.

Note. The author saw the plants growing wild and cultivated specimens originating from the Samarkand mountains.

77. I. bucharica Foster in Gard. Chron XXXI (1902) 385, f. 135. — I. orchioides auct. fl. As. Med., p.p. — Ic.: Flora and Sylva III (1905) 344 (sinistra).

571 Perennial; roots thickened, fusiform; bulb ca. 2 cm in diamter, well developed; stem 15–30 (50) cm long, the leaves distant and the internodes more or less distinct toward the end of flowering; leaves pale green, falcate, gradually attenuate toward apex, narrowly marginate, the margin more or less rough-ciliate; lower leaves 1.5–3 (5) cm broad; flowers (1)–4 (6), inodorous or scented (?); perianth tube 3.5–5 cm long, greenish-yellow; outer segments 3.5–4.5 cm long; claw with parallel margins, 6–10 cm broad, pale yellow to almost white, gradually enlarged into the limb, the 2–4 longitudinal greenish-violet veins prolonged into the blade and there terminating on the sides of the ridge in diffuse greenish-violet spots; limb oblong to oblong-ovate, emarginate, dark yellow, 8–20 by 10–20 mm; ridges dark yellow, undissected, crenate; inner segments 1–2 cm long, pale yellow to almost white, acute, the more or less elongate rhomboidal limb often obtusely 3-lobed; style crests pale yellow to almost white, obliquely triangular, acutish, 4–7 by 10–15 mm, the upper margin more or less crenulate; stigmas more or less obreniform to nearly semicircular; anthers and pollen whitish. March-April.

Pebble beds and slopes in the lower mountain zone. — Centr. Asia: Pam.-Al., valleys of Surkhan-darya, Kafirnigan, Vakhsh, Ak-su and Kizyl-su rivers. Endemic. Described from cultivated specimens originating from Surkhob River valley.

Note. The author saw the plants growing wild on the Gissar Range. The species displays great variability in the shape and size of perianth parts, but all the small-flowered specimens from areas of the former Bal'dzhuanskoe beylic require special attention.

78. I. magnifica Vved. sp. n. — I. caucasica var. major Maxim. in A.H.P. (1880) 497. — I. amankutanica O. Fedtsch. in Herb. pp. et in Bull. Jard. Bot. Princ. XXIII (1924) 115 (nomen nudum).

Perennial; roots much thickened, fusiform; bulb ca. 3 cm in diameter, well developed; stem strong, 25–40 cm long, with distant leaves and pronounced internodes; leaves pale green, lustrous, falcate; scarcely marginate, the margin scabrous; lower leaves 3–5 cm broad; flowers (2)–3–7, inodorous; perianth tube 4.5–5 cm long, greenish-violet; outer segments ca. 5 cm long, pale lilac or sometimes almost white; claw winged, 2–2.5 cm broad in enlarged part and ca, 7 mm at base, the 4 longitudinal violet veins sometimes prolonged to the base of the limb; limb white, oblong, scarcely narrowed toward base, 13–22 by 20–25 mm, scarcely emarginate at apex, a dark yellow blotch on the sides of the undissected white ridge overflowing at the front onto the ridge; inner segments pale lilac, faintly marked with 3 violet veins, 22–27 mm long, the limb obovate
572 obtuse; style crests pale lilac, obliquely triangular, obtuse, 4–5 by 10–11 mm, the margins entire; stigmas flattened semicircular; anthers and pollen whitish. April-May. (Plate XXXV, Figure 1, a–c).

Rock crevices and fine-textured spaces among rocks. — Centr. Asia: Pam.-Al.: Samarkand mountains. Endemic. Described from Ak-sai Ravine.

Note. The author saw the plants growing wild in the Samarkand mountains and cultivated specimens derived from the same area.

79. I. Willmottiana Foster in Gard. Chron. XXIX (1901) 261, f. 100. — I. amankutanica O. Fedtsch. in herb. p. p. — Ic.: Garden LXVI (1904) t. 1264, f. I.

Perennial; roots cordlike, only slightly thickened (?); bulb ca. 2 cm in diameter, well developed; stem 10–20 cm long, with approximate leaves and imperceptible internodes; leaves falcate, gradually attenuate toward apex, marginate, the margin smooth; lower leaves ca. 3 mm broad; flowers 4–6, ranging from white to violet; perianth tube ca. 5 cm long; claw winged, ca. 15 cm broad in enlarged part and ca. 8 mm at base, with violet veins; limb oblong, scarcely narrowed toward base, slightly emarginate at apex, 10 by 17 mm, violet, white in median part, marked with darker nerves; ridge undissected, white (?); inner segments ca. 1.5 cm long, violet, the limb acute rhomboidal or 3-lobed; style crests broadly and obliquely triangular, acutish, 5 by 12 mm, the margins entire; stigmas obreniform; anthers and pollen whitish. May.

Slopes in foothills. — Centr. Asia: Pam.-Al. Derbent. Endemic. Described from cultivated specimens originating from "Eastern Turkestan".

80. I. orchioides Carr. in Rev. Hort. (1880) 337. — I. Tubergeniana, Vved. in Opr. rast. okr. Tashk. 1 (1923) 75 (non Foster).

Perennial; roots cordlike, little thickened; bulb ca. 2 cm in diameter, well developed; stem (10)–20 (30) cm long, the leaves subdistant, the internodes distinct at least by the end of flowering; leaves pale green, falcate or rarely nearly straight, gradually attenuate toward apex, marginate, the margin more or less scabrous; lower leaves 1.5–3 (4.5) cm broad; flowers (1)–3–4 (8), pale yellow, in fading anthocianin-tinged, inodorous or faintly scented; perianth tube 3–6 cm long, often violet; outer segments 3–4.5 cm long, pale yellow; claw strongly winged, 1.5–2.5 cm

broad in enlarged part and 6–9 mm at base; limb elliptic, slightly narrowed toward base, often emarginate at apex, 8–12 by 12–18 mm, the large dark yellow well defined blotch occupying nearly the entire surface and sometimes dotted violet-green on the sides of the ridge; ridge dark yellow, reaching far down the claw, sometimes to its base, on the limb undissected crenate,
573 on the claw dissected*; inner segments 7–15 mm long, pale yellow, the limb 3-lobed acute; style crests pale yellow, obliquely triangular, obtusish, 4–6 by 9–10 mm, the margins entire; stigmas obreniform; anthers and pollen whitish. March-July.

Stony clay slopes, from the foothills up to 2000 m. — Centr. Asia: Syr D., T. Sh.; Kara-tau, Aleksandrovskii Range, Talass and Tashkent Ala Tau, Mogol-tau. Endemic. Described from station of Darbaz (vicinity of Tashkent). Type in Tashkent.

Note. The author saw the plants growing wild in the vicinity of Tashkent and cultivated specimens originating from Ugam and Alamedin. Comparison of this plant material indicates a marked lack of uniformity.

81. I. **maracandica** Vved. in Sched. Herb. Fl. As. Med. (1935) No. 662.— Juno maracandica Vved., ibid.

Perennial; roots fusiform, thickened; bulb ca. 2 cm in diameter, well developed; stem 10–15 cm long, with approximate leaves and imperceptible internodes; leaves falcate, gradually attenuate toward apex, smooth-margined, the lower leaves 1.5–2 cm broad; flowers 1–(4), strongly scented, violet-tinged in fading; perianth tube 3–4.5 cm long; outer segments 3.5–4 cm long, pale yellow; claw winged, ca. 2 cm broad in the enlarged part and 9 mm at base, black-dotted along the veins; limb elliptic, slightly narrowed toward base, ca. 1 by 1.5 cm, dark yellow; ridge dark yellow, undissected, crenate; inner segments pale yellow, 1–1.5 cm long, the limb rhomboidal acute; style crests pale yellow, obliquely triangular, obtusish, 5 by 10 mm, the margins entire; stigmas semicircular; anthers and pollen whitish. March-April.

Gravelly slopes in foothills. — Centr. Asia: Pam.-Al.: Dzhizak, Samarkand, Akrabat. Endemic. Described from Dzhizak. Type in Tashkent.

Note. The author saw the plants growing wild in the vicinity of Dzhizak.

82. I. **Tubergeniana** Foster in Gard. Chron. XXV (1899) 225. — Ic.: Garden. LXVI (1904), t. 1264, f. 2.

Perennial; roots cordlike, only slightly thickened; bulb ca. 2 cm in diameter, well developed; stem ca. 10 cm long, with approximate leaves and imperceptible internodes; leaves pale green, falcate, gradually attenuate toward apex, marginate, the margin more or less scabrous; lower leaves 1.5–2.5 cm broad; flowers 1–3, yellow, lustrous, inodorous; perianth tube 4.5–5 cm long, slightly suffused with violet; outer segments 4–4.5 cm long, yellow; claw winged, ca. 1 cm broad in the enlarged part and 5 mm at base, faintly marked with greenish-violet longitudinal veins and dotted along the midvein; limb obovate, narrowed toward base, 1 by 1.5 cm, dark yellow, with violet-green spots on the sides of the ridge; ridge dark yellow, reaching down to the middle of the claw, dissected;

* In plants from Mogol-tau mountains and from Ugam the ridge is often undissected.

574 inner segments ca. 1.5 cm long, yellow, the limb 3-lobed acute; style crests yellow, obliquely triangular, obtusish, 4 by 9 mm, the margins entire; stigmas elongate-semicircular; anthers and pollen whitish. March-April.

Clay hills in the foothill zone. — Centr. Asia: Syr D. Endemic. Described from specimens grown by the Tubergen establishment, without indication of provenience. Dykes (Iris, 196) writes that these specimens originate from the vicinity of Tashkent.

Note. The author saw the plant growing wild at the station of Darbaz and at the Kaplan-bek natural boundary.

83. **I. caucasica** Hoffm. in Comm. Soc. Phys. Mosc. I (1808) 40. — Juno caucasica (Hoffm.) Klatt in Bot. Zeit. XXX (1872) 498. — Ic.: Sweet. Brit. Fl. Gard. III (1828) tab. 255. — Exs.: Herb. Fl. Cauc. No. 60; Pl. orient. exs. No. 33.

Perennial; roots subfusiform, only slightly thickened; bulb ca. 2 cm in diameter, well developed; stem 10–20 cm long, the leaves approximate to subdistant, the internodes only just discernible; leaves glaucescent, falcate, gradually attenuate toward apex, marginate, the margin densely woolly-ciliate or very rarely nearly smooth; lower leaves 5–20 mm broad; flowers 1–3; perianth tube ca. 4 cm long, sometimes flushed with violet; outer segments (3)–3.5–4 cm long, pale yellow or grayish; claw winged, (12)–15–20 mm broad in enlarged part and 3–7 mm at base; limb elongate-semiorbicular, not narrowed at base, (7)–12–15 by (10)–17–20 mm; ridge yellow, undissected, crenate; inner segments 15–20 mm long, pale yellow, oblanceolate, entire or rarely 3-lobed at the top; style crests broadly and obliquely triangular, obtusish, 5–8 by 9–11 mm, the margins entire; stigmas obreniform. March-April.

Dry gravelly hills in the foothills zone, ascending to 2000 m. — Caucasus; E. and S. Transc. Gen. distr.: N. Iran, Asia Minor (?). Described from the vicinity of Tiflis.

Note. Plants from S. Transcaucasia deserve further study, as the specimens derived from there have a smooth leaf margin and weakly developed wings on the claws of outer perianth segments.

84. **I. pseudocaucasica** Grossh. in Minot. Jard. Tiflis 40–41 (1916) 11.

Perennial; roots fusiform, thickened; bulb well developed, ca. 2 cm in diameter; stem ca. 10 cm long, with approximate leaves and imperceptible internodes; leaves falcate, gradually attenuate toward apex, marginate, the margin scabrous; lower leaves 1–2 cm broad; flowers 2–4, azure or yellowish-azure, drying pale violet; perianth tube 3.5–4.5 cm long; outer segments 3.5–4 cm long; claw winged, (15)–18–22 mm broad in the enlarged
575 part and 5–7 mm at base; limb oblong, not narrowed at base, round-tipped, 8–11 by 10–12 mm, apparently with a yellow blotch at the base of the ridge; ridge undissected, yellow; inner segments 15–18 mm long, oblanceolate, acute; style crests obliquely ovate, obtusish to obtuse, 5–6 by 8–10 mm; stigmas obreniform. April.

Dry stony slopes, at an altitude of about 1000 m. — Caucasus: E. Transc., Tal. Endemic. Described from Zuvant. Type in Tiflis.

Note. The author saw the authentic plants. The inner perianth segments are incorrectly described: they are oblanceolate and not linear.

85. I. drepanophylla Aitch. et Baker in Trans. Linn. Soc. Ser. II, III (1888) 115.

Perennial; roots thickened, fusiform; bulb ca. 1.5 cm in diameter, well developed; stem 10–20 cm long, with subdistant leaves and distinct internodes; leaves falcate or very often obliquely twisted, gradually attenuate toward apex, slightly margined; the margin scabrous; lower leaves 5–10–16 mm broad; flowers (1)–2–4–(6), pale yellow, inodorous; perianth tube greenish, ca. 4 cm long; outer segments 3.5–4 cm long; claw with parallel margins, 5–7 mm broad, gradually enlarged into the limb, marked with interrupted buff veins; limb obovate, 8–10 by 12–15 mm, the central part dark yellow; ridge undissected, yellow, the margin entire; inner segments linear, acute, 5–8 mm long; style branches obliquely triangular, acutish, 4 by 10 mm long, with entire margins; stigmas very short, emarginate; anther white, with yellowish pollen. April.

Clay hills. — Centr. Asia: Mtn. Turkm. (Kushka area). **Gen. distr.**: Badkhyz. Described from Hari Rud Valley.

Note. The author saw the plants growing wild in the Kushka area and cultivated specimens originating from the same area.

86. **I. kopetdagensis** Vved. in Sched. Herb. Fl. As. Med. (1935) 660. — Juno kopetdagensis Vved., ibid.

Perennial; roots thickened, fusiform; bulb ca. 1.5 cm in diameter, well developed; stem 15–30 cm long, usually with closely approximate leaves and imperceptible internodes; leaves falcate, gradually attenuate toward apex, marginate, the margin scabrous; lower leaves (1) 2–3 cm broad; flowers 2–6–(10), pale greenish, inodorous; perianth tube 4–4.5 cm long; outer segments 3.5–5.5 cm long; claw gradually narrowed at both ends, broadest about the middle and there 6–8 mm broad, marked with green veins; limb elliptic, obtuse, 6–10 by 10–15 mm, green-veined, a yellow blotch occupying one-third of the limb surface; ridge yellow, undissected, crenate; inner segments linear, acute, ca. 1 cm long; style crests obliquely triangular, acutish, 3–4 by 10–14 mm, the margins entire; anthers white, with yellowish pollen. April.

576 Stony and clayey slopes in the lower mountain zone. — Centr. Asia: Mtn. Turkm. (Kopet Dagh). **Gen. distr.**: N. Iran. Described from Karakal. Type in Tashkent.

Note. The author saw cultivated specimens originating from the Karakal area.

87. **I. leptorhiza** Vved. in Bull. Univers. As. Centr. 21 (1935) 151. — Juno leptorhiza Vved. ibid.

Perennial; roots slender, filiform; bulb ca. 1 cm in diameter, well developed, the coats brown with very prominent convex nerves; stem obsolescent with quite imperceptible internodes; leaves 3 or 4, closely approximate, falcate, gradually attenuate toward apex, marginate, the margin more or less scabrous; lower leaves 7–10 mm broad; flower solitary, violet-green; perianth tube ca. 4 cm long; outer segments ca. 3.5 cm long; claw with parallel veins, ca. 5 mm broad, gradually enlarged into the limb; limb obovate, emarginate at apex, 7 by 10 mm; ridge undissected; inner segments linear-lanceolate, acute, ca. 1 cm long; style crests obliquely triangular, acutish, 3 by 10 mm, the margins entire; stigmas elongate-semicircular; anthers barely shorter than filaments. March.

Centr. Asia: Pam.-Al. Found by Michelson on a single occasion in mountains of Tabakcha, at Vakhsh River. Endemic. Type in Leningrad.

Note. Flower color as has been reported in conformity with the collector's notes on the label.

Natural hybrids are known between species of the Juno section. The author found a hybrid I. Narbuti × I. maracandica in the environs of Dzhizak, and in the vicinity of Darbaz station came across hybrids of I. orchioides × I. Narbuti and I. subdecolorata × I. Narbuti.

Several thousand bulbs of I. vicaria, collected at the same location in the Badkhyz area, gave rise to one specimen which was intermediate between I. vicaria and I. bucharica in all characters, but the claw in this specimen has winged auricles — a feature absent in the species mentioned.

Genus 308. **BELAMCANDA*** ADANS.**

Adans. Fam pl. II (1763) 70.

Perennial plants with ensiform-lanceolate leaves and a leafy stem; inflorescence subdichotomously branched; perianth brightly colored, widely spreading, rotate, of 6 segments shortly united at base; stamens inserted at the base of perianth, with slender filaments; anthers lanceolate,
577 basifixed; ovary obovoid, 3-celled, with numerous ovules in each cell; style filiform, 3-cleft; stigmas villous; capsule obovoid, membranous, loculicidal, the valves curving away at dehiscence and exposing the slender central column; seeds large, subglobose.

1. B. **chinensis** (L.) Leman in Redouté Liliac., t. 121; Kom. and Alis., Opred. rast. Dal'nevost. kr. 386. — Ixia chinensis L. Sp. pl. ed. I (1753) 36. — Pardanthus chinensis Ker.-Gawl. in Ann. of Botany t. 246; Baker Iridac., 117. — Ic.: Redouté Liliac., t. 121., Flore des Serres XVI (1865–7) tab. 1632.

Perennial, 60–100 cm long, stoloniferous, with fleshy rootstock; leaves 15–20 mm broad; inflorescence spreading, containing 3–12 flowers; bracts subtending inflorescence branches abbreviated, green; involucral bracts coriaceous membranous; pedicels 15–20 mm long, joined at the end; perianth reddish-brown or yellowish with blackish-purple spots. May-June. (Plate XXXI, Figure 16).

Sandy coastal meadows. — Far East: Uss. (Pos'et Bay area). Gen. distr.: Jap.-Ch., India. Described from India. Type in London.

Note. A perennial garden plant, hightly valued for its hardiness and beautiful flowers.

Genus* **SISYRINCHIUM**† L.††

L. Gen. pl. (1735) 273; Sp. pl. (1753) 954.

Perianth with obsolescent tube and a flat, convex or widely campanulate limb; segments subequal, obovate or oblong; stamens inserted at the base

* A local Indian name for the species.

** Arranged by B.A.Fedchenko.

† Name used by Theophrastus for some plant with a sweet-tasting bulb.

†† Arranged by B.A.Fedchenko.

of perianth, the filaments usually more or less adnate to the tube; anthers erect or ascending; ovary spherical or shortly oblong, 3-celled, with numerous ovules in each cell; style filiform, short or exceeding the stamens, the tips of style branches acting as receptive stigmatic surfaces; capsule globose to oblong, loculicidal; rootstock very short, sometimes thickened, with tufts of roots; stem terete or compressed with sharp angles; leaves mostly radical or borne on the lower part of the stem, narrow; floral leaf [bract] mostly solitary, terminal; flowers several on common peduncle, in an inflorescence subtended by the floral bract.

578 **S. angustifolium** Mill., Gard. dict. ed. 8 (1768) No. 2; Baker Handb. Irid. (1892) 124. — S. bermudiana L. Sp. pl. (1763) 954 pp. — S. gramineum Curt., Bot. Mag. (1799) tab. 646. — Ic.: Bot. Mag. l.c.

Perennial, 25–35 cm tall; stem erect or ascending, conspicuously winged toward base, the wing 3–5 mm broad; leaves radical, linear-ensiform, 3–5 mm broad; floral bracts lanceolate, herbaceous, with a narrow white margin; flowers 1–4 in inflorescence, ca. 15 mm in diameter; perianth segments oblong to oblong-ovate, pale violet, apiculate; filaments adnate to anthers; fruit globose, 2.5–3 mm long.

European part: U.V., (near Moscow, adventive). Gen. distr.: N. Am., adventive in Atl. Eur. (Great Britain), N. Eur. (Germany, Czechozlovakia, Austria).

Genus 309. **GLADIOLUS** * L.**

L. Syst. ed. I (1735)

Perianth zygomorphic, with a more or less curved tube and 6 unequal segments; stamens 3; anthers linear, slightly bifid at base; ovary superior, 3-celled, the cells many-ovuled; style filiform; stigmas 3, dilated spatulate or ovate from a filiform base; capsule membranous; seeds compressed and winged or wingless, globular-pyriform. Herbaceous bulbose plants with linear-ensiform leaves; inflorescence a 1-sided or 2-sided spike; bracts [spathes] 2-valved.

Note. Bulbs of species of this genus were formerly used in medicine for the treatment of wounds "Radix victorialis rotundae", although their use is explained rather by superstition than by their effectiveness. Most of them are bred for the beauty of their flowers.

1. Leaves parallel-nerved . . . . . 8.
\+ Leaves with irregular nervature, the nerves approaching the margin about the middle of the blade . . . . . 2.
2. Seeds globose, wingless; perianth segments not approximate, the upper segment somewhat divergent . . . . . 3.
\+ Seeds narrowly winged; all perianth segments approximate . . . . . 4.
3. Flowers 5–5.5 cm long, suberect, the tube short, the upper perianth segments somewhat divergent and reflexed at the tip; anthers obtusish; spike 2-sided, loose; capsule globose-ovoid, to 10 mm long, umbilicate at the top . . . . . 1. **Gl. segetum** Ker.-Gawl.

* Name first occurring in the writings of the Roman author Pliny (1st century A.D.), a diminutive form of gladius, sword, referring to the ensiform leaves of gladiolus.

** Arranged by E.G.Chernyakovskaya.

579 + Flowers smaller, horizontally spreading, the upper segment arched-declined above the others; spike 1-sided, longer, many-flowered; capsule ovaloid-ovoid, to 15–20 mm long . . . . . 2. Gl. turkmenorum E. Czerniak.

4. Flowers large, 4–4.5 cm long, dark purplish-violet; perianth segments broadly ovate to suborbicular, the claws narrow; upper segments shorter than the lower; leaves broadly linear-ensiform, to 2 cm broad, overtopped by inflorescence; stems 75–100 cm long . . . . . 3. Gl. communis L.

+ Stem shorter; flowers smaller; perianth segments oblong; leaves 3–15 mm broad . . . . . 5.

5. Spike 2-sided, short, loosely 3–5-flowered; flower tube slightly curved; perianth segments narrow, rhomboidal-oblong, obtuse apiculate, the upper segments longer and broader than the lower, the lateral segments narrower and shorter than the upper; leaves 3, acuminate, linear, 3–6 mm broad, exceeding the stem; stigmas abruptly enlarged from the middle to form a suborbicular-ovate stigmatic surface; bracts about equaling the flowers; capsule obovoid . . . . . 4. Gl. tenuiflorus Koch.

+ Spike short, 1-sided, 3–7-flowered . . . . . 6.

6. Spike loose; corm tunics coarsely reticulate-fibrous . . . . . 5. Gl. palustris L.

+ Spike dense; corm tunics consisting of fine parallel fibers . . . . . 7.

7. Flowers dark lilac, closely approximate, imbricated, with a strongly curved tube; perianth segments subequal, rounded-obovate, subobtuse, the claws narrow; stigmas gradually enlarged from base, oblanceolate; capsule 8–10 mm long, obovoid, umbilicate at the top; leaves 2, overtopped by inflorescence, linear-ensiform to lance-linear, 5–15 mm broad, the lowest leaf subobtuse . . . . . 6. Gl. imbricatus L.

+ Flowers dark violet, the tips of segments paler; flowering spike short, densely 3- or 4-flowered; perianth segments ovate-spatulate, narrowly unguicular, the upper segments shorter, the lower exceeding the lateral; leaves 2, broadly linear, 7–9 mm broad, long-acuminate, exceeded by the stem; capsule ovoid . . . . . 7. Gl. Kotschyanus Boiss.

8. Plants 45–75 cm tall; leaves narrowly linear, 4–7 mm broad, acuminate, equaling or slightly exceeded by the stem; spike 1-sided, 5–8-flowered; flowers dark lilac to almost blackish-lilac, 3–3.5 (4) cm long; lower perianth segments longer than the upper, the lateral segments of the
580 upper lip and central segment of the lower lip shorter; capsule oblong, umbilicate, 15 mm long; seeds wingless . . . 8. Gl. atroviolaceus Boiss.

+ Plants 15–25 cm tall; stems slender; leaves narrowly linear, 2–3 mm broad, glaucous, rigid, shorter than to slightly exceeding the stem; spike very loose, 2- or 3-flowered; spathe bracts lanceolate, barely longer than perianth tube, the margin and apex membranous; flowers pink, 2.5–3 cm long; lateral perianth segments shorter . . . . . 9. Gl. halophilus Boiss. et Heldr.

1. **Gl. segetum** Ker-Gawl. in Bot. Mag. (1803) tab. 719; Ldb. Fl. Ross. IV, 108; Shmal'g., Fl. II, 466. — G. Ludoviciae Jan. in Nov. Comm. Bonon., I (1834) 74. — Ic.: Bot. Mag. t. 719; Rchb. Ic. Fl. Germ. IX (1847) Figure 781; Rchb. Ic. crit. tab. 600. — Exs.: Herb. Fl. cauc. No. 118.

Perennial; bulb globose, ca. 2 cm broad; corm tunics brown, of coarse parallel fibers, very firm, reticulate with longitudinal alveoles in upper part; stem 30–80 cm long; leaves ensiform, to 18 mm broad, acute, few-nerved, the midnerve thicker than the rest; the nerves in lower part part of the blade abruptly curved and approaching the inner margin; leaves greatly overtopped by inflorescence, scarcely reaching the lowest flower; spike loosely 6–10-flowered, nearly 2-sided, slightly curved; spathe bracts lanceolate, one about twice as long as the other, the lowest bracts 5–6 mm long and nearly equaling the flowers; flowers suberect; perianth pink, spreading campanulate, 5–5.5 cm long; perianth tube to 5 mm long, slightly curved; perianth segments oblong; upper segment longer and broader than the two lateral segments, slightly divergent backward, overlapping and leaning over the lateral segments, its tip slightly reflexed; lower segments narrower than the lateral, equaling the upper segment, with a white-banded keel; anthers obtusish, slightly longer than filaments; stigma attenuate from base to the middle and then gradually enlarged into an oblong-spatulate surface, ciliate; capsule globose-obovoid to subturbinate, to 1 cm long, umbilicate at apex, 3-grooved, obtusely 3-angled; seeds brownish, globose-turbinate, wingless, with a downward-pointing process. June-July. (Plate XXXVI, Figure 2, a,b).

Dry sunny slopes of low loess hills, water meadows, river banks (Bukhara), and meadows (Crimea). In the Caucasus, on slopes among spiny shrub and in cultivated fields.— European part: Crim.; Caucasus: Dag., E. and S. Transc., Tal.; Centr. Asia: Pam.-Al. (Bal'dzhuan on banks of Kizyl-su River up to 1700 m above sea level; Kulyab on river floodplains, on Vakhsh on wooded mountain slopes), Turkm. Mtn. (in Kushka area). Gen. distr.: Med., Canary Islands, Iran. Described from S. France (Dauphine Province). Type in London.

var. gigantea E. Czerniak. f. n. Strongly developed in all its parts;
581 stem more than 1 m long; leaves 5, broad, acuminate; spike elongated, 2-sided, 15- or 16-flowered; spathe bracts very large, unequal, the outer to 16 cm long, the inner considerably shorter, to 3.5–4 cm long; capsule ca. 1 cm long, obovoid-turbinate, umbilicate. Coming into flower in May. Fl. and fr. June.

Caucasus: E. Transc. (Perimbal, Kusary, Sal'yany, Mugan), Tal. (Limar).

Note. This species differs from the closely related Gl. communis in its narrower leaves and in perianth shape. The broader upper segment is divergent and reclining above the lateral segments, whereas in Gl. communis the upper segment is included among the remaining segments; the upper lateral segments are about as long and narrower than the 3 lower segments, these all the same length, the middle segment somewhat narrower than the others, while in the case of Gl. communis the lateral segments are usually broader than the three lower segments, the central segments twice as broad.

2. **Gl. turkmenorum** E. Czerniak. sp. nova in Addenda III, p. 750.— Exs.: Sint. transc.-pers. (1900–1901) No. 306 (sub Gl. atroviolaceus var. floribus pallidioribus majoribus Bornm. et Sint.).

Perennial; corm ca. 2 cm in diameter; upper tunics brown, lower tunics cinnamon-colored, thin, finely fibrous, entire above, slightly reticulate-fibrous, with narrow elongated alveoles, in lower part with parallel fibers,

topped beneath the outer tunic by a short firm hyaline hood; stems 45–85 cm long, 3-leaved; leaves green, about equaling the stem (the uppermost leaf commonly overtopped by inflorescence), lanceolate, 6–13 mm broad, long-acuminate, irregularly nerved, the nerves in lower part of the leaf blade converging and approaching the margin; first sheathing leaf to 5 cm long, the lowest 9–20 cm long, obliquely truncate, obtuse; spike 1-sided, rather compact, long, sometimes up to 30 cm, many-flowered; bracts green, broadly lanceolate, 3.5–4 cm long, the lower outer bracts foliaceous to 7–11 cm long; flowers 8–12, curved, obliquely spreading, 4–4.5 cm long, raspberry-pink; perianth tube to 10 mm long, slightly recurved; 3 lower segments subequal, barely longer than the upper bract, oblong-ovate, narrowed to a short claw, slightly acuminate, the lateral segments shorter than the upper; upper segments arching above the other segments; anthers about twice the length of filaments; acuminate, to 15 mm long; stigmas obovate; capsules up to 11, ovaloid-ovoid, 16–20 mm long, 1 cm in diameter, the valves membranous-coriaceous; seeds large, reddish-brown, 2.5–3 mm in diameter, wingless. Fl. April-May; fr. June. (Plate XXXVI, Figure 1, a–c).

Water meadows, river valleys, old fields, cotton fallows, and as a weed in wheat fields. Ascending to 1500 m above sea level. — Centr. Asia:
582 Mtn. Turkm. (town of Vannovskii, Sumbar and Chandyr valleys, Kara-Kala, Syunt). Gen. distr.: Iran (N. part). Described from town of Vannovskii. Type in Leningrad.

Note. This species differs from the closely related Gl. segetum in its broader leaves (up to 2 cm), larger (5–5.5 cm long) suberect flowers, slightly spreading dorsal segment, short tube, 2-sided spike with more scattered flowers, and the turbinate umbilicate capsule to 1 cm long. All leaves of Gl. segetum are the same length, shorter than and barely reaching the inflorescence. The features distinguishing the species from Gl. atroviolaceus are the shape of perianth, broader bracts, and thicker stems.

3. **Gl. communis** L. Sp. Pl. ed. I (1753) 36, pro parte; Shmal'g., Fl. II, 466; Bot. Mag. (1793) tab. 86; ibid. t. 1575; Redouté Lil. t. 267. — Ic.: Rchb. Ic. Crit. t. 598; Fl. Germ. t. 349, f. 777.

Perennial; stems 75–100 cm long; corm tunics coarsely parallel-nerved, reticulate narrowly alveolate in upper part; leaves 2 or 3, shorter than inflorescence, linear-ensiform, to 2 cm broad; spike 1-sided, densely 5–8-flowered, 7–9 cm long; bracts to 3 cm long, lanceolate shorter than flowers, unequal, to 4.5 cm long in fruit; flowers large; perianth campanulate, 4–4.5 cm long, dark purplish-violet with strongly curved tube; perianth segments convergent, subequal, approximate; upper segments broadly ovate, obtuse, narrowly unguiculate; dorsal segments ca. 2 cm broad; lower segments longer, narrower, also broadly ovate, with a whitish median band; anthers shorter than filaments, ca. 2 cm broad; stigma gradually enlarged from base to an obovate surface, the margin pubescent; capsule large, ovaloid to obtusely obovoid, 14 cm long, sharply angled, deeply grooved; seeds flattened, broadly winged. Fl. May-August. (Plate XXXVI, Figure 3, a, b).

Subalpine meadows in mountains up to 2100 m above sea level, forest glades, mountain meadows (Crimea), river valleys, and barley fields (in Armenia). Often cultivated. — European part: Crim.; Caucasus: Cisc., E., W. and S. Transc. Gen. distr.: Med., Iran (Ziarat). Described from S. Europe.

4. Gl. tenuiflorus C. Koch, Linnaea XXI (1848) 636; Grossh., Fl. Kavk. I (1928) 258. — Gl. illyricus C. Koch. β anatolicus Boiss. Fl. Or. V (1884) 140. — Ic.: Rchb. Fl. Germ. t. 352, f. 780.

Perennial; stem 90–120 cm long; corm tunics thin, reticulate, entire, split and parallel-nerved in lower part; leaves 3, elongate, exceeding the stem, linear, 3–6 mm broad, acuminate, the nerves not parallel; spike short, loose, 2-sided; bracts lanceolate, acute, the lower about the length
583 of flower; flowers 3–5, with slightly curved tube; perianth segments narrowly rhomboid-oblong, obtuse, apiculate; dorsal segments longer and much broader than the lower segments; lower segments broader than the lateral, the latter narrower and shorter than the dorsal; anther about as long as the filaments; stigmas linear to the middle and then abruptly enlarged to a rounded ovate surface; capsule obovoid, trigonous; seeds narrowly winged. (Plate XXXVI, Figure 4, a).

Cultivated fields on marls, up to 200 m above sea level. — Caucasus: E. Transc. Gen. distr.: Asia Minor, W. Persia. Described from Shirvan. Type in Berlin.

5. Gl. palustris Gaud. Fl. Helv. I (1828) 97. — Ic.: Rchb. Ic. Fl. Germ. tab. 351, f. 779; Shmal'g., Fl. II, 465; Fedch. and Fler., Fl. Evr. Ross. 259.

Perennial; bulb ovaloid; corm tunics coarsely parallel-nerved, reticulate with round or oval mesh; stem slender, 30–60 cm long; leaves 2 or 3, linear, to 9 mm broad, fine-pointed; spike 1-sided, loosely 2- or 3 (-5)-flowered; bracts green, lanceolate, to 2 cm long, shorter than flowers; flowers purple with curved tube; perianth segments obovate, obtuse, closely approximate, the dorsal broader than the rest; anthers shorter than filaments; capsule oblong-obovoid, shallowly 3-grooved, rounded at apex; seeds winged.

Boggy meadows. Infrequent. In USSR in U. Dnp., near Mogilev and Rogachev. Gen. distr.: Centr. Eur. Described from Switzerland.

6. Gl. imbricatus L. Sp. Pl. ed. I (1753) 37; Shmal'g., Fl. II, 465. — Gl. tenuis M.B. Fl. Taur.-Cauc. I (1800) 29. — Ic.: M.B. Cent. pl. Fl. Ross. tab. 60; Rchb. Ic. Crit. t. 599; Rchb. Ic. Fl. Germ. Figure 778. — Exs.: HFR No. 840a and 840; Fl. polon. exs. No. 387.

Perennial; corm globose, 1–1.5 cm in diameter; corm tunics finely parallel-nerved, tightly implexed in upper part; stems erect, slender, to 70 cm long, 2-leaved; basal leaves 1 or 2, scalelike, 2–6 cm long, obtusely and somewhat obliquely truncate; cauline leaves 2 or 3, ensiform or lance-linear, 5–15 mm broad, few-nerved, the nerves shifting toward the margin in lower part; lower stem leaf ensiform, obliquely divergent, broader than the rest, mostly obtuse; upper leaves linear-lanceolate, long-acuminate, the uppermost leaf short, all leaves overtopped by inflorescence; spike 1-sided, 5–8 cm long, 3-angled in outline, densely 3–7-flowered; flowers

closely approximate, imbricated; bracts green, herbaceous, short-lanceolate, 25–30 cm long, subequal, half the length of flower; perianth purplish-violet, (2.5)–3–3.5 cm long, the tube strongly curved; perianth segments subequal, rounded-obovate, obtusish, narrow-clawed,
584 subconnivent, all about the same length; filaments slightly longer than anthers; stigmas gradually enlarged from base, oblanceolate; capsule 8–10 mm long, obovoid, obtusely 3-angled; seeds ferruginous-brown, narrow-winged, ovaloid, 3–5 mm long. Fl. May-July; fr. July-August. (Plate XXXVI, Figure 6).

Wet, boggy and inundated meadows, dry valley meadows, coppices, mixed oak and spruce woods, swampy grass plots, subalpine mountain meadows and near glaciers up to 1500 m, rarely as weed in wastelands, long-fallows, and cultivated fields. — European part: Lad.-Ilm., U. V., V.-Ka., U. Dnp., U. Don, L. Don, Crim.; Caucasus: throughout except Tal.; W. Siberia: U. Tob. (Mugodzhary Mountains). Gen. distr.: Bal.-As. Min., Centr. Eur., W. Med. Described from the European part of the USSR.

Note. There are white-flowered forms, reported as var. albiflorus V. Krecz. (Belorussian SSR, Kalitinskii District, Balynkovichskii Region). Similar forms also occur in other regions. Small-flowered forms (Gl. tenuis M.B.) occur in W. Transcaucasia.

7. **Gl. Kotschyanus** Boiss. Diagn. Ser. I, 13 (1853) 15. —
Gl. imbricatus L. β Kotschyanus Boiss. Fl. or. V, 141. —
Gl. Raddeanus Trautv. A.H.P. III, 2 (1875) 273.

Perennial; stems 35–65 cm long; corm tunics with parallel reticulately implexed fibers; leaves 2, broadly linear, 7–9 mm broad, long-acuminate, 5- or 6-nerved, the nerves not parallel, the midnerve thicker and curved; spike short, densely 3- or 4-flowered; spathe bracts acuminate, broadly membranous-margined, much longer than the perianth tube; flowers fairly large, dark violet, the perianth segments lighter in color on the periphery; tube strongly curved; segments ovate-spatulate to suborbicular, narrow-clawed, the upper segments shorter, the lower segment longer than the lateral one; anthers much shorter than filaments; stigmas glabrous, abruptly enlarged above the middle into an oval ciliate surface; capsule ovoid, 3-angled, umbilicate; seeds narrow-winged. Fl. May-June, August.

Subalpine meadows up to 3000 m above lea level. — Caucasus: S. Transc. (area of Nakhichevan and Sarykamysh). Gen. distr.: Asia Minor, Arm.-Kurd., Iran. Described from Mesopotamia.

587 8. **Gl. atroviolaceus** Boiss. Diagn. Ser. I, 13 (1853) 14. —
Gl. aleppicus Boiss, ibidem.

Perennial; corm tunics rigidly parallel-fibered, reticulate with narrow elongated mesh; stem slender, 45–75 cm long, bent at the end; leaves 3, narrowly linear, 4–7 mm broad, acuminate, 6-nerved, all nerves equidistant and of same thickness, the lowest leaf shorter than the others, these barely overtopped by or equaling the inflorescence; lowest sheathing leaf 4–14 (17) cm long, obliquely long-truncate; spike short, rather loosely 2–3–6 (8)-flowered, 1-sided; spathe bracts narrowly lanceolate, acuminate, unequal, the lower longer than perianth tube; flowers dark lilac,

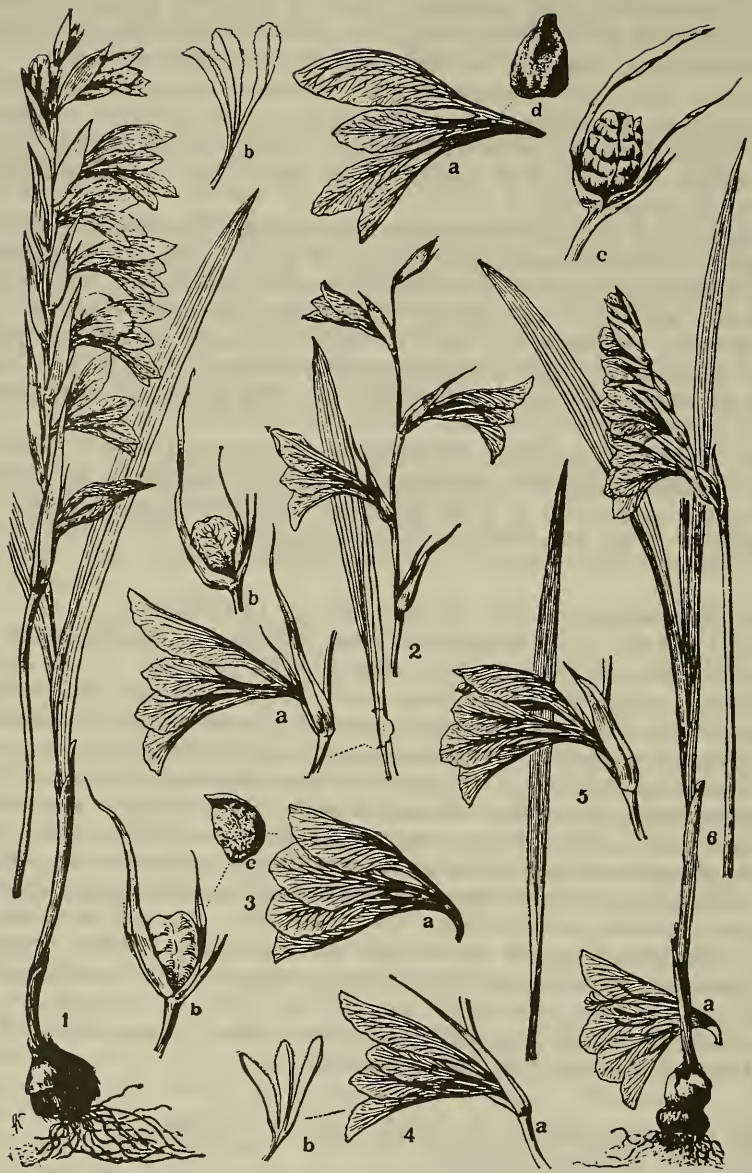

Plate XXXVI

1. Gladiolus turkmenorum E. Czerniak., a) perianth, b) stigmatic lobes, c) capsule, d) seed.— 2. G. segetum Ker-Gawl., a) perianth, b) capsule.— 3. G. communis L., perianth, a) capsule, b) seed.— 4. G. tenuiflorus C.Koch., perianth, a) stigmatic lobes.— 5. G. atroviolaceus Boiss.— 6. G. imbricatus L., a) flower.

3–3.5 (4) cm long, spreading or deflexed; tube strongly curved; segments obovate to oblong-spatulate, considerably narrowing to a short claw; dorsal segment strongly recurved, the paler upper segments shorter than the lower; lateral segments of the upper lip and usually also those of the lower lip shorter; anthers as long as or barely longer than filaments, terminating in a scarcely curved cusp; stigmas linear to the middle then web-footed; capsule oblong, 15 mm long, 7–9 mm in diameter, concave, 3-grooved, torulose, the valves thin; seeds globose-turbinate or pyriform, wingless, 4-angled, dark cinnamon-brown, ca. 2 cm in diameter. Fl. April-May; fr. May-June. (Plate XXXVI, Figure 8).

Steppe foothills, wormwood or feathergrass mountain steppes, rocky crevices, dry barren stony places, mountain slopes up to 1900 m above sea level, as a weed in waste and cultivated fields. — Caucasus: S. Transc. (surroundings of Erivan, Nakhichevan and Zangezur Range); Centr. Asia: Mtn. Turkm. (Kopet Dagh Mountains, mountain slopes in the steppe zone). Gen. distr.: E. Med., Arm.-Kurd., Iran (N.). Described from Persia (Teheran, in cultivated fields). Type in Leningrad.

Note. A species readily distinguishable from the closely related Gl. imbricatus by its nervature, the wingless seeds, and the leaves that nearly surpass the inflorescence.

Boiss. (Fl. Or. V, 142) records erroneously under G. atroviolaceus Buhse's specimens from Azerbaijan (Schah-Jordi) which are undoubtedly Gl. Kotschyanus Boiss.

In Central Asia, Gl. atroviolaceus occurs in mountainous part of Turkmenistan in Kara-Kala area, and in central Kopet Dagh in area of Firyuza (Chuli-Chaek-Dushak) and Kurt-su, invariably in the grass-steppe zone, where it replaces Gl. turkmenorum that does not ascend to such altitudes. Its distinguishing characteristics are the few-flowered inflorescence, the dark almost blackish-violet flowers, the nearly bilabiate perianth with lower segments much longer than the upper, the lateral segments of the upper lip and the central segments of the lower being shorter than the rest.

588 9. **Gl. halophilus** Boiss. et Heldr. Diagn. Ser. I 13 (1853) 14; Boiss. Fl. Or. V, 142. — G. Szovitsii Grossh. Beih. Bot. Centr. XLIV (1927) Abt. II 206; Grossg., Fl. Kavk. I (1928) 258. — G. tenuis auct. in herb., pr. parte (non M.B.).

Perennial; corms ovoid, 1.5–2 cm long; corm tunics with thick stiff parallel fibers from base to apex, the fibers anastomosing over the whole surface; stems 15–25 cm long, slender, flexuous at the ends; spike short, bent, very loosely 2- or 3- (5)-flowered; bracts lanceolate, thick, barely exceeding the perianth tube, the margin and apex membranous; flowers pink, 2.5–3 cm long; perianth wide open, with curved tube; perianth segments obovate, obtuse, the lateral shorter than the rest; anthers slightly shorter than filaments; stigmas gradually enlarged from base, oblanceolate. Fl. May-June.

Wet saline meadows, solonchak plains, and dry clayey hills. — Caucasus: E. Transc. (between Migra and Karchevan; reported by A.A. Grossheim (Fl. Kavk. 258) for Nakhichevan); Gen. distr.: Asia Minor; Iranian Azerbaijan, vicinity of Khoi and Maragh. Described from Asia Minor. Type in Leningrad.

Note. The new species described by Grossheim (Beih. Bot. Centrb. XLIV, 1927) under the name Gl. Szovitsii does not differ in any way from Gl. halophilus of Asia Minor. A comparison of the Caucasian and Persian material from the Szovits collections referred to by Grossheim with the authentic specimens of Gl. halophilus discloses perfect identity of these two species. The author himself refutes in a later study (Fl. Kavk., l.c.) one of the main characters in pointing our that the leaves of Gl. Szovitsii are grayish and not green as stated in the original description.

As regards Szovits' collections from Iran, listed as No. 134 under the name Gl. tenuis, it appears upon close scrutiny that we are here concerned with mixed material which contains, in addition to the above-mentioned Gl. halophilus, also Gl. tenuiflorus C. Koch. and Gl. Kotschyanus Boiss. et Heldr. All the three species were collected by Szovits in Iran (vicinity of Khoi, Azerbaijan province).

Order 9. **Microspermae**

Flowers perfect, 3-merous, 5-seriate, of the monocotyledonous type; perianth corolloid, mostly zygomorphic, rarely subactinomorphic (certain Burmanniaceae); style 6, in Burmanniaceae 3, in Orchidaceae androecium greatly reduced; fruit a capsule; seeds minute and very numerous, albuminous (Burnmanniaceae) or desalbuminous (Orchidaceae); embryo very undeveloped (commonly subspherical, externally undifferentiated into organs).

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Family XXXVII. **ORCHIDACEAE** LINDL.*

Lindl, Nat. Syst. ed. 2 (1836) 336; Rchb Nomencl. (1841) 50.– Orchideae Hall. Enum. Stirp. Helv. I Praef. (1742) 33.

Flowers perfect, zygomorphic; perianth commonly colored, corolloid, of 6 segments in 2 series, the 3 outer segments [sepals] similar, but the lateral ones usually inequilateral and sometimes united into one apically 2-toothed sepal, or more rarely all 3 sepals united to form a 3-lobed hood; segments of the inner perianth whorl unequal: two of them [petals] more or less resembling the sepals, though mostly shorter, narrower and directed upward; the third, referred to as the lip [or labellum], usually directed downward, though it is in fact dorsal, but due to torsion of ovary and consequent reversion of the entire flower, appearing to be the lower segment, differing more or less conspicuously in shape, size and coloring from all the other segments, often prolonged at base into the spur; of the 6 biseriate stamens only 1 or 2 developed, the others completely undeveloped or rudimentary and transformed into staminodia, the single fertile stamen (the anterior one of the outer series) united by its filament with the style into a column or gynostemium, the anthers thus appearing sessile, coalescent through their entire length or merely at base; with a

* Arranged by S.A. Nevskii.

single stamen, there are 2 small staminodia at the site of the 2 anterior stamens of the inner series; in the case of 2 developed stamens (Cypripedium); these are the anterior ones of the inner series, their very short filaments united in lower part with the style into a thick column, and between them the anterior stamen of the outer series replaced by a large petaloid staminodium; anther bilocular, the approximate or more or less distant locules dehiscent due to a longitudinal chink, the connective sometimes prolonged into a small pointed process (in Serapias and Ophrys); pollen in each locule commonly cohering in a clavate or cuneate called pollinium, rarely pollen grains separate (in Cypripedium); pollinia loose with powdery pollen or compact and often adherent by means of a stalk [or caudicle] to a viscid gland or cushion [retinaculum], this surmounted by a beak [rostellum] and readily detachable; the beak constitutes a more or less developed extension of the column, arising at the base of the anther locules, lamella-shaped and sometimes trilobate; in the latter case the middle appendage or lobe of the beak arises between the bases of anther locules, forming together with the lateral appendages a hemispherical single or double pouch containing glands adherent to
590 caudicles; the pollinia together with their stalks or caudicles and the glands are designated as pollinaria; a single gland sometimes serves both pollinia, but more often each pollinium has its own gland or retinaculum; stigma a glutinous and mostly concave surface situated below the anther locules below the beak; more rarely stigmas 2, borne on thickish appendages (in Habenaria); ovary inferior, sessile or stalked, 1-celled, 3-carpellate, with 3 parietal placentae and numerous ovules; fruit a capsule dehiscent by 6 longitudinal chinks; seeds minute, desalbuminous, with a broad transparent reticulate coat and a subspherical, mostly undifferentiated embryo.

Perennial plants with creeping or short rhizomes, or with tuberlike roots [tuberoids] representing thickened roots and serving as organs for food storage; tuberoids commonly 2: one old and more or less wrinkled, supporting a stem with leaves and flowers; the other young, smooth, filling up with photosynthetic products and giving rise to a new stem the following year. In some genera, the base of stem displays an oblong-ovoid or ovoid tuberlike swelling [pseudobulb] clothed with membranous sheaths of old leaves.

Key to Genera

1. Saprophytic plants, destitute of chlorophyll and without developed leaves. . . . . 2.
+ Stem bearing green leaves or rarely flowering stems leafless and covered with membranous sheaths, the leaves arising separately from the rhizome or tube . . . . . 6.
2. Lip with a more or less developed spur . . . . . 3.
+ Lip spurless . . . . . 4.
3. Lip and spur turned upward . . . . . 325. Epipogon S. G. Gmelin.
+ Lip and spur turned downward . . . . . 324. Limodorum L. C. Rich.
4. Sepals and petals united into a sac cleft on the lower side, 5-lobed on the margin and enclosing the free lip . . . . . 326. Gastrodia R. Br.

+ Perianth segments distinct . . . . . 5.

5. Rhizome fleshy, coralloid, destitute of root fibers; pollinia waxy, compact . . . . . 316. **Corallorhiza** Hall.

+ Rhizome short, densely beset with rather thick upturned roots; pollinia containing powdery pollen . . . . . 321. **Neottia** Sw.

6. Lip spurless . . . . . 7.

+ Lip with a more or less developed spur . . . . . 24.

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7. Lip inflated, saccate, slipper- or shoe-shaped; flowers large, showy. . . . . 8.

+ Lip flat or more or less concave or convex, but not inflated shoe-shaped . . . . . 9.

8. Perianth segments 4 (discounting the lip), the lateral sepals being united into one terminally 2-cleft segment behind the lip . . . . . 310. **Cypripedium** L.

+ Perianth segments 5 (discounting the lip), subequal, ascending and arcuately spreading . . . . . 314. **Calypso** Salisb.

9. Inflorescence axis spirally twisted . . . . . 327. **Spiranthes** L.C. Rich.

+ Inflorescence axis not twisted. . . . . 10.

10. Plants with globose or ovoid tuberoids . . . . . 11.

+ Plants with creeping rhizomes, beset with cordlike roots or clusters of slender spreading roots, or the base of scape forming an ovoid pseudobulb clothed with membranous sheaths of old leaves . . . . . 14.

11. Flowers small; perianth segments 2.5–3.5 (4) mm long; glands naked. . . . . 12.

+ Flowers large or medium-sized; perianth segments 6–30 mm long; glands contained in pouches . . . . . 13.

12. Tuber solitary, globose; leaves 2 (3) . . . . . 331. **Herminium** R. Br.

+ Tubers 2, ellipsoid or ovoid; leaves 6–10, crowded on the lower part of the stem . . . . . 332. **Chamaeorchis** L.C. Rich.

13. Sepals and petals acuminate, together forming a hood; lip divided into a broadly reniform concave posterior part and a pendent lanceolate acuminate frontal part . . . . . 351. **Serapias** L.

+ Sepals and petals obtuse, spreading; lip convex and velvety, entire or 3-lobed. . . . . 352. **Ophrys** (L.) Sw.

14. Base of scape forming an ovoid tuber clothed with membranous sheaths of old leaves; sometimes tubers several, approximate and resembling rhizomes . . . . . 15.

+ Plants with creeping rhizomes beset with cordlike roots or with clusters of slender spreading roots. . . . . 18.

15. Flowers nodding to pendulous; lip 3-lobed, with 2 keel-like lamellae at base . . . . . 317. **Oreorchis** Lindl.

+ Flowers borne on upright or slightly divergent pedicels; lip entire, flat or concave; the upper surface devoid of lamellae . . . . . 16.

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16. Petals much shorter than sepals . . . . . 311. **Malaxis** Soland.

+ Petals as long as but much narrower than petals . . . . . 17.

17. Lip flat or nearly so, with crisped wavy margin, 4.5–11 mm long. . . . . 313. **Liparis** L.C. Rich.

+ Lip to 2.75 mm long, broadly ovate and slightly concave at base, narrowed at apex to a linear-lanceolate point. . . 312. **Microstylis** Nutt.

18. Lip with a notch or constriction on each side, divided into a more or less concave posterior part (gynochil) and a flat or nearly flat and sometimes smaller anther part (epichil). . . . . 19.

\+ Lip not divided into gynochil and epichil, 3-lobed or 2-lobed, flat or concave . . . . . 22.

19. Flowers small; perianth segments 3–4 (5) mm long; dorsal sepal and petals united into a hood; lateral sepals spreading . . . . . 20.

\+ Flowers larger; perianth segments 6–25 mm long, spreading or in campanulate arrangement . . . . . 21.

20. Leaves ovate or elliptic . . . . . 328. **Goodyera** R.Br.

\+ Leaves narrow, linear . . . . . 329. **Zeuxine** Lindl.

21. Flowers sessile or subsessile; ovary twisted at base . . . . . 323. **Cephalanthera** L.C.Rich.

\+ Flowers with a straight ovary borne on a twisted pedicel . . . . . 322. **Epipactis** Adans.

22. Lip 3-lobed, the large central lobe with velvety-bearded margins; flower solitary, large, pink . . . . . 319. **Pogonia** Juss.

\+ Lip without a velvety-bearded lobe, 2-lobed or entire; flowers rather small, shades of yellowish-green or greenish . . . . . 23.

23. Stem bearing in the middle a pair of approximate nearly opposite leaves . . . . . 320. **Listera** R.Br.

\+ Leaf solitary, basal, apparently petiolate . . . . . 315. **Ephippianthus** Rchb.f.

24. Stems leafless, with membranous sheaths; leaves narrowly linear, reminiscent of grass leaves, arising in a separate cluster from the tuber and developing later . . . . . 318. **Eulophia** R.Br.

593 \+ Stems leafy . . . . . 25.

25. Tuberoids digitately branched or elongate-ovoid and tapering to a ropelike tip, or else the plants producing creeping rhizomes . . . . . 26.

\+ Tuberoids unbranched, ovoid to subglobose, obtuse . . . . . 38.

26. Anther terminal, attached at base; lip notched on both sides, divided into gynochil and epichil, the upper surface ot the epichil with keel-like lamellae . . . . . 323. **Cephalanthera** L.C.Rich.

\+ Anther attached through its entire length; lip undivided, without lateral notches, the upper surface without keel-like lamellae . . . . . 27.

27. Flowers lilac-pink, purple or violet-purple . . . . . 28.

\+ Flowers white, greenish-white, yellowish, greenish, or if yellowish-greenish then sometimes faintly flushed with reddish-brown . . . . . 31.

28. Plants with creeping rhizome; leaf solitary at the base of the scape . . . . . 343. **Galeorchis** Rydb.

\+ Plants with tuberoids, these digitate or elongate-ovoid and prolonged into a cordlike tip . . . . . 29.

29. Flowers plain, not spotted; glands naked or none . . . . . 30.

\+ Lip marked with darker spot, very rarely almost plain; glands contained in a bursicule . . . . . Subgenus **Dactylorhiza** Neck. of the genus **Orchis** — 348.

30. Leaves rounded-elliptic or broadly elliptic; caudicles and glands absent . . . . . 334. **Neolindleya** Kränzl.

\+ Leaves linear or lance-linear; caudicles and glands present . . . . . 342. **Gymnadenia** R.Br.

31. Lip 3-lobed or 3-toothed at apex . . . . . 32.

\+ Lip entire . . . . . 35.

32. Spur longer than the lip, 5–20 mm long; glands contained in bursicules . . . . . 33.

+ Spur shorter than the lip, 2–2.5 mm long; glands naked . . . . . 34.
33. Lip at base with a short triangular appendage or a tooth on each side; flowers small, yellowish-greenish . . . . . 338. **Perularia** Lindl.
+ Lip shortly 3-lobed at apex; flowers medium-sized, yellowish . . . . . Subgenus **Dactylorhiza** Neck. of the genus **Orchis** — 348.
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34. Flowers yellowish-greenish, sometimes flushed with reddish-brown; lip 3-toothed at apex, the median tooth usually shorter than the lateral, the lip several times the length of the spur . . . . . 335. **Coeloglossum** Hartm.
+ Flowers whitish or whitish-yellowish; lip 3-lobed at apex, the median lobe longer than the lateral, the lip only slightly longer than the spur. . . . . 336. **Leucorchis** E. Mey.
35. Stem densely leafy; leaves acuminate, linear-lanceolate or narrowly lanceolate . . . . . 341. **Limnorchis** Rydb.
+ Stem bearing 1 or 2 leaves at base, in lower part, or about the middle; leaves elliptic, obovate or elliptic-ovate, obtuse . . . . . 36.
36. Lip suborbicular, 1–1.25 mm long and 1 mm broad; flowers very small, the perianth segments ca. 2 mm long. . . . . 337. **Pseudodiphryllum** Nevski.
+ Lip linear or linear-lanceolate; flowers larger . . . . . 37.
37. Lip with 2 obtuse tubercles near the base above; leaf solitary at the base of stem; flowers small, the lip 3–3.25 mm long . . . . . 340. **Lysiella** Rydb.
+ Lip flat, not tubercled; flowers larger, the lip 5–20 mm long . . . . . 339. **Platanthera** L.C. Rich.
38. Stigmas 2, on more or less separated and long thickish processes. . . . . 330. **Habenaria** Willd.
+ Stigmas sessile, forming a viscid surface . . . . . 39.
39. Sepals united into an apically 3-toothed hood . . . . . 40.
+ Perianth segments distinct . . . . . 41.
40. Lip 3-lobed, the median lobe rounded-expanded, the lateral lobes subfalcate . . . . . 347. **Steveniella** Schlechter.
+ Lip 3-lobed, the lateral lobes extended into very long filiform tips, the median lobe bifid with 2 such filiform processes; ovary short-stalked . . . . . 346. **Comperia** C. Koch.
41. Ovary short-stalked; lip 3-lobed, the median lobe lorate and 1.3–6.5 cm long . . . . . 350. **Himantoglossum** W.D. Koch.
+ Ovary sessile or nearly so; lip entire or 3-lobed, the median lobe never so long . . . . . 42.
42. Caudicles attached to a single common gland; lip shortly 3-lobed, with 2 crestlike lamellae at the base above . . . . 349. **Anacamptis** L.C. Rich.
595
+ Each caudicle attached to a separate gland; lip without prominent lamellae . . . . . 43.
43. Inflorescence 1-sided . . . . . 44.
+ Inflorescence regular, cylindric, ovoid-cylindric or ovoid-spherical. . . . . 45.
44. Sepals and petals united into a broad hood; glands naked . . . . . 333. **Neottianthe** Schlechter.
+ Lateral sepals recurved-spreading; glands contained in 2 separate hemispherical bursicules . . . . . 344. **Chusua** Nevski.

45. Perianth segments long-acuminate, spatulate and slightly thickened at tips; glands not completely contained in 2 separate pouches . . . . . 345. Traunsteinera Rchb.f.

\+ Perianth segments not spatulate at tips; glands enclosed within a 2-celled pouch . . . . . 358. Orchis L.

TRIBE I. **CYPRIPEDIEAE** LINDL.

Lindl. Orch. Scel. (1826) 718.

Stamens 2, the third infertile and transformed into a petaloid staminoid.

Genus 310. **CYPRIPEDIUM*** L.

L. Gen. Pl. ed. 1 (1737) 372.

Perianth segments spreading; dorsal sepal ovate or elliptic, the lateral pair united into one bifid segment behind the lip; petals oblong or pandurate; lip sessile or minutely unguiculate, strongly inflated, slipper-shaped, the involute margins of the wide orifice forming a rim enlarged at base into broad obtuse lobes on each side; column stout, the petaloid staminodium surmounting the stout column and representing the third infertile stamen, sessile or short-stalked, oblong-lanceolate or oblong-rectangular, sagittate-cordate or rounded at base; anthers of the 2 fertile stamens on each side of the column, the very short filaments produced above the anthers into thickish processes; stigma peltate, 3-angled or 3-lobed, the papillose surface reaching the bottom of the lip; ovary not twisted.

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1. Stem bearing 2 approximate leaves about the middle; flower solitary; petals obtuse (Section 1. Ambyopetala Nevski) . . . . . 2.

\+ Cauline leaves (3) 4; flowers solitary or gathered in a small terminal raceme (Section 2. Oxypetala Nevski) . . . . . 3.

2. Petals pandurate, gradually attenuate from a broad inequilateral base, not enlarged or scarcely enlarged at apex; lip 2–2.3 cm long, but slightly exceeding the petals and shorter than or about equaling the dorsal sepal, this white like the lip and marked with large more or less confluent violet-pink spots . . . . . 1. **C. guttatum** Sw.

\+ Petals fiddle-shaped, attenuate from a broad inequilateral base, expanded and rounded at apex; lip 2.5–3.1 cm long, greatly exceeding the petals and longer than the greenish-yellow dorsal sepal; lip brownish-yellow to greenish-yellow or dingy purple and faintly spotted . . . . . 2. **C. Yatabeanum** Makino.

3. Lip yellow, shorter than sepals and petals . . . . . 4. **C. calceolus** L.

\+ Lip lilac-pink or violet-pink (rarely white) . . . . . 4.

4. Lateral sepals and petals ovate-lanceolate, not longer than the lip; dorsal sepal broadly ovate . . . . . 3. **C. macranthum** Sw.

\+ Lateral sepals and petals oblong-lanceolate, slightly longer than the lip; dorsal sepal elliptic . . . . . 3. **C. macranthum** Sw. var. **ventricosum** (Sw.) Rchb.f.

* Distortion of Greek Cypripedilum, the shoe of Cypris (Venus).

Section 1. **AMBLYOPETALA** Nevski (Sect. Eucypripedilum subsect. Obtusipetala Pfitzer in Engl. Pflzr., Orch. Pleon. (1903) 29).

1. **C. guttatum** Sw. in Acta Acad. Holm. (1800) 251; Ldb. Fl. Ross. IV, 88; Turcz. Fl. baic.-dah. II, 2, 191; Shmal'g., Fl. II, 464; Kom. Fl. Mansh 1 (1901) 508, Kryl., Fl. Zap. Sib. III, 675. — C. Calceolus L. var. β L. Sp. Pl. ed. 1 (1753) 951. — C. variegatum Georgi, Reise 1 (1775) 232, nomen. — C. orientale Sprgl., Syst. III (1826) 746. — C. Yatabeanum Kränzlin Orch. Sibiriae in Journ. Russe Bot. (1913) 56 (non Makino). — Ic.: Rchb. Ic. Fl. Germ. XIII (1851) t. 143. — Exs.: HFR No 533, 2042.

Perennial; rhizome long, creeping; stems 15–30 cm long, covered with long spreading hairs below the leaves and with short glandular hairs above; leaves elliptic to ovate-elliptic, acuminate, 6–12 cm long, 3.5–6 cm broad, the nerves beneath and the margin sparsely hairy; bract foliaceous, ovate-
597 lanceolate to lanceolate; dorsal sepal elliptic-oval, acuminate, 1.8–2.8 cm long and to 1.8 cm broad, white or marked with violet-pink spots; lateral sepals united, green, glandular-pubescent, 1.2–1.7 cm long; petals lip white with large confluent violet-pink spots; staminodium oblong-rectangular, notched at apex; ovary fusiform, densely covered with short glandular hairs. May-June. (Plate XXXVII, Figure 3).

Coniferous and mixed woods, and glades. — European part: Dv.-Pech., V.-Ka., U. V., V.-Don, U. Dnp., Transv.; W. Siberia: U. Tob., Ob, Irt., Yen., Alt.; E. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Ze.-Bu., Uss., Uda, Sakh. Gen. distr.: Mong., Jap.-Ch. (Manchuria, Korea), Tibet.

Note. There are no reliable specimens of this species from Kamchatka in Russian herbaria, although Hulten reports Cypripedium guttatum from the peninsula. It also appears that C. guttatum does not occur in North America, since all the plants from Alaska and Unalaska that the author has been should be referred to C. Yatabeanum Makino.

2. **C. Yatabeanum** Makino in Bot. Mag. Tokyo XIII (1899) 91; Kom. Flora penins. Kamtsch. I (1927) 309. — C. guttatum Sw. var. Yatabeanum (Makino) Pfitzer in Engl. Pflanzr. IV, 50 (1903) p. 33. — Ic.: Miyoshi et Makino Pock. Atl. Alp. Pl. Jap. I (1907) t. 1, Figure 3.

Perennial; rhizome long, creeping; stems 25–40 cm long, furnished at base with 2 brown membranous sheaths, the hairs up to the leaves long and spreading, short and glandular above; leaves subdistant or nearly opposite, practically always 2 (very rarely 3), ovate to elliptic-ovate, 8–15 cm long, 4.5–8 cm broad, acuminate, hairy on the nerves beneath and on the margin, as in C. guttatum turning black upon drying; bract ovate to ovate-lanceolate, 2–3 cm long, 0.7–1.2 cm broad; dorsal sepal broadly oval, slightly pubescent on the outer face and on the margin, 2–2.5 cm long, 1.4–1.7 cm broad, yellowish-green; lateral sepals united, greenish, 2-fid, 1.3–1.8 cm long, 0.6–0.9 cm broad; petals fiddle-shaped, inequilateral and 0.6–0.7 cm broad at base, attenuate upward to ca. 2 mm and rounded-enlarged again at apex to 3–3.75 mm, yellowish-green (rarely whitish) with dingy purple spots, 1.6–1.9 cm long; lip brownish-yellow or greenish-yellow or often dingy purple and faintly spotted at base or throughout; staminodium orange-yellow, short and broad; ovary densely glandular. July-August. (Plate XXXVII, Figure 4).

Betula Ermanni Cham. woods. — Far East: Kamch. Gen. distr.: Jap.-Ch. (Japan), Ber., N. Am. Described from Hokkaido. Type in Tokyo.

598 Section 2. OXYPETALA Nevski (Sect. Eucypripedilum subsect. Acutipetala Pfitzer in Engl. Pflzr., Orchid. Pleon. (1903) 29).

3. **C. macranthum** Sw. in Acta Acad. Holm. (1800) 251; Ldb. Fl. Ross. IV, 87; Turcz. Fl. baic.-dah. II, 2, 190; Shmal'g., Fl. II, 464; Kom. Fl. Mansh. I (1901) 506; Kom. Fl. penins. Kamtsch. II (1927) 210; Kryl., Fl. Zap. Sib. III, 677. — Sacodon macranthum Rafin., Fl. Tellur. IV (1836) 45. — Ic.: Rchb. Ic. Fl. Germ. XIII (1851) t. 146.

Perennial; rhizome short, creeping, stout, with filiform flexuous roots; stem 25–45 cm long, with brownish sheaths at base, bearing 3 or 4 leaves higher up, rather sparsely glandular; leaves alternate, sessile, amplexicaul at base, broadly elliptic or oval, acuminate, 8–16 cm long, 4–7 cm broad, slightly hairy on the nerves and on the margin; flower as a rule solitary; bract foliaceous, elliptic, 7–10 cm long, 2.5–6 cm broad; perianth lilac or violet-pink with darker veins, the base of all segments and the lower face of the lip paler and speckled; dorsal sepal broadly oval, 4–6 cm long, 2.5–3.5 cm broad; lateral sepals united into one bifid segment, shorter than the dorsal; petals asymmetrical, ovate-lanceolate to lanceolate, glabrous, 4–6 cm long, 1.5–2 cm broad below the middle; lip obovate, (4) 4.5–5–7 cm long, with a narrow orifice, shorter to longer than petals; staminoid whitish, speckled with violet-purple, ovate, obtusely tipped, subsessile, cordate at base, 1.3–1.5 cm long, 0.75–1.1 cm broad; ovary subsessile or tapering to a very short pedicel, glandular-pubescent or glabrate. — In var. ventricosum (Sw.) Rchb. f. (= C. ventricosum Sw. in Acta Acad. Holm. (1800) 251) the petals are lanceolate and exceed the lip, the dorsal sepal is elliptic, and the flower somewhat paler in color, This variety occurs invariably together with typical plants and is linked to them by intermediate forms. June-July. (Plate XXXVII, Figure 1, 2).

Forest glades and broad-leaved (rarely pine) woods. — European part: U. Dnp., V.-Ka.; W. Siberia: U. Tob., Ob, Irt., Alt., Yen.; E. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Ze.-Bu., Uss., Uda, Sakh., Kamch. Gen. distr.: Mong., Jap.-Ch.

4. **C. calceolus** L. Sp. Pl. ed. I (1753) 951, p. pt.; Ldb. Fl. Ross. IV, 86; Turcz. Fl. baic.-dah. II, 2, 189; Boiss. Fl. Or. V (1884) 94; Shmal'g., Fl. II, 464; Kom. Fl. Mansh. I (1901) 505; Kryl., Fl. Zap. Sib. III, 679. — C. microsaccos Kränzlin Orch. Sibiriae in Journ. Russe Bot. (1915) 58. — Ic.: Rchb. Ic. Fl. Germ. XIII (1851) t. 144. — Exs.: HFR No. 79.

Perennial; rhizome creeping, stout, beset with long flexuous roots; stem (20) 25–50 cm long, with brown sheaths at base, covered all the way
599 up with short glandular hairs; leaves 3 or 4, elliptic or broadly elliptic, acuminate, (7) 10–17 cm long, 3.5–7 (10) cm broad, both sides and the margin hairy; flowers 2 or 3 or solitary, subtended by a foliaceous elliptic-lanceolate acuminate bract; sepals and petals reddish-brown; lip pale yellow, reddish-speckled within; dorsal sepal elliptic-lanceolate, rarely ovate, acuminate, sparsely glandular outside at base, profusely veined, 3.5–5 cm long, 1.2–2.5 cm broad; lateral sepals united into one bifid sepal

resembling the dorsal but somewhat narrower; petals horizontal, asymmetrical, linear-lanceolate, acuminate, 4–6 cm long, 0.5–0.8 cm broad, slightly twisted; lip ca. 3 cm long; staminodium whitish, purple-speckled on upper face or merely on the margins, broadly oblong, obtuse, slightly cordate at base and narrowed to a short claw; stamens and style with stigma pale yellow; ovary glandular. June.

Thin deciduous and mixed woods, coppices, and glades. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. Dnp., M. Dnp., V.-Don, U. V., V.-Ka., Transv., L. Don, Crim.; W. Siberia: U. Tob., Ob, Irt. Alt.; Yen.; E. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Ze.-Bu., Uss., Uda, Sakh. Gen. distr.: Scand., Centr. Eur., Bal.-As. Min., Atl. Eur., Med., W. Mong., Jap.-Ch. Described from Eurasia. Type in London.

Note. The species Cypripedium microsaccos, established by Kränzlin, was described by him from poorly developed specimens of C. calceolus and is synonymous with the latter. This author and V. L. Komarov both report for the Far East a hybrid C. calceolus × C. macranthum, but the hybrid origin of the specimens here referred to is subject to doubt and they are probably mere color variants of C. macranthum Sw. The hybrid derivation of C. macranthum Sw. var. ventricosum (Sw.) Rchb. f (Rolfe) is also widely assumed, but it does not stand up to criticism.

TRIBE II. **MALAXIDEAE** LINDL.

Lindl. Orch. Scel. (1826) 7, 17.

Stamen 1; anther terminal, attached at base; pollinia waxy, compact; caudicles none; lip spurless.

Genus 311. **MALAXIS*** SOLAND

Soland. ex Sw. Prodr. Veget. Ind occ. (1778) 119.

Sepals oblong-ovate, the dorsal turned upward, the lateral ones downward; petals much shorter, asymmetric, lanceolate; lip directed
600 upward by a twist of pedicel, oval, concave, more or less pointed, thicker and shorter than sepals; column short; anther persistent, small, reniform, with approximate locules, the locule-halves superposed; pollinia cuneate, biparted; beak longer than anther, erect, bladelike, concave above, the margin with 3 or 2 small teeth; ovary about half the length of the twisted pedicel; flowers small, yellowish-green, glabrous, more or less erect.

1. **M. paludosa** (L.) Sw. in Acta Acad. Holm. (1800) 235; Ldb. Fl. Ross. IV, 51; Turcz., Fl. baic.-dah. II, 2, 174; Shmal'g., Fl. II, 446; Kryl., Fl. Zap. Sib. III (1929) 714. — Ophrys paludosa L. Sp. Pl. ed. 1 (1753) 947. — Orchis paludosa Pall. Reise III (1776) 320. — Hammarbya paludosa O. Ktze, Rev. Gen. II (1891) 665. — Ic.: Rchb. Ic. Fl. Germ. XIII (1851) t. 142. — Exs.: HFR No. 1495; Pl. Finl. exs No. 171a and b, 582.

Perennial; rhizome filiform, the oblong-ellipsoid tuber renewable each year, covered with leaf sheaths; stem slender, 6–20 (25) cm long; leaves

* From Greek malacos, soft.

3 or 4, rather thick, elliptic, 1–2.7 cm long, on the average 0.5–1.1 cm broad, borne near the stem base, a swelling in the axil of the upper leaf destined to develop into next year's tuber; raceme erect, many-flowered, 2–7 (sometimes up to 12) cm long; bract shorter than to about as long as pedicel with ovary, lanceolate; sepals 2.5–3 mm long and 1.5 mm broad; petals 1.5 mm long and much narrower; lip 1.75–2 mm long, 1.25 mm broad. July-August. (Plate XXXVII, Figure 5).

Peat bogs. — European part: Kar.-Lap., Dv.-Pech., U. Dnp., V.-Don, U. V., Lad.-Ilm., V.-Ka., L. Don; W. Siberia: Ob; E. Siberia: Ang.-Say., Dau. **Gen. distr.**: Scand., Atl. Eur., W. Med. Described from Sweden. Type in London.

Genus 312. **MICROSTYLIS*** NUTT.

Nutt, Gen Amer. II (1818) 196, nomen conservandum – Achroanthes Rafin., Med. Repos. N. York V (1808) 352.

Flowers with lip turned upward by torsion of the pedicel, small, greenish, slightly spreading; sepals ovate to ovate-lanceolate, 1-nerved, the median sepal turned downward; petals as long as sepals but merely a quarter to one-third as broad, linear, directed downward and slightly recurved; lip broadly ovate at base, attenuate to a linear-lanceolate tip, thickish, slightly incurved, the narrow recurved folds near the base terminating in teeth, the margins below somewhat thickened and densely covered with minute tubercles up to the apex; column short and rather
601 thick; anther caducous, broadly ovaloid, the locule-halves side by side; pollinia 2, cuneate; beak 3-angled, shorter than anther; ovary short-stipitate.

1. M. **monophyllos** (L.) Lindl. Gen. et Sp. Orch. (1840) 19; Ldb. Fl. Ross. IV, 50; Turcz. Fl. baic.-dah. II, 2, 173; Shmal'g., Fl. II, 446; Kom. Fl. Mansh. I (1901) 530; Kryl., Fl. Zap. Sib. III (1929) 715. — Ophrys monophyllos L. Sp. Pl. ed. 1 (1753) 947. — Malaxis monophyllos Sw. Acta Acad. Holm. XXI (1800) 234. — Achroanthes monophylla Greene, Pittonia II (1891) 183. — Malaxis diphylla Chamisso, Linnaea III (1828) 34. — Microstylis diphylla Lindl. Gen. et Sp. Orch. (1840) 23. — Ic.: Rchb. Ic. Fl. Germ. XIII (1851) t. 141. — Exs.: HFR No. 137.

Perennial; stem (8) 10–25 (30) cm long, the basal tuber surrounded by sheaths of old leaves; leaf solitary (rarely 2), borne above the tuber, ellipsoid or ovoid-oblong, attenuate to an obtuse apex, 3–10 cm long, 1.2–5 cm broad, narrowed at base into an amplexicaul petiole; second leaf, if present, much smaller; raceme many-flowered, 3–15 cm long; bracts lanceolate, acuminate, equaling or shorter than ovary with pedicel; perianth segments all about same length, 2–2.7 mm long; lip 0.5–0.8 mm broad at broadest part; column about one-sixth as long as the lip. June-July. (Plate XXXVII, Figure 6).

Forest glades and coppices. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V. Dnp., V.-Ka., V.-Don, M. Dnp.; W. Siberia: U. Tob., Ob, Alt., Irt.; W. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Kamch., Okh., Uss., Ze.-Bu., Sakh. **Gen. distr.**: Scand., Centr. Eur., W. Med.,

* Alluding to the small size of the gynostemium.

Bal.-As. Min., Jap.-Ch., Mong., N. Am. Described from E. Siberia. Type in London.

Genus 313. **LIPARIS*** L. C. RICH.

L.C.Rich. in Mem. Mus. Par. IV (1818) 52.

Sepals ligulate-lanceolate or lanceolate, obtuse, 3-nerved, commonly auriculate at base; petals narrowly linear, 1-nerved, about as long as sepals; lip about equaling the petals, ovate or cuneate-obovate, directed downward or rarely upward, narrowed toward base, with slightly undulate margins, obtuse with a small obtuse point; column curved, elongated; anther with a membranous process, caducous; the locule-halves side by side; pollinia 4; beak short; ovary clavate, borne on a twisted pedicel; flowers erect or slightly spreading.

602 Plants with an ovoid tuber covered with dead leaf sheaths, bearing a pair of leaves and an angled scape more or less winged on the angles.

1. Lip elliptic or oval, narrowed toward base, 4.5 mm long, 2.3 mm broad; leaves oblong or elliptic-lanceolate, 1.2–2.5 cm broad. . . . . 1. **L. Loeselii** (L.) L.C.Rich,

\+ Lip cuneate-obovate, 6.5–1 mm long, 5–8 mm broad; leaves ovate to ovate-oblong, 2–7 cm broad. . . . . 2.

2, Raceme many-flowered (flowers (6)9–21); lip and petals wine-red, 8–11 mm long . . . . . 3. L. Makinoana Schlechter.

\+ Raceme loosely few-flowered (flowers 3–11 (15)); lip, petals and sepals yellowish-green, 6–7 mm long . . . . . 2. **L. japonica** (Miq.) Maxim.

Note. The species Liparis sachalinensis, described by Nakai from the southern part of Sakhalin, resembles, according to that author, the Japanese L. auriculata Bl. It is possible that this plant occurs also in the northern part of the peninsula. The species is not represented in Russian herbaria.

1. L. **Loeselii** (L.) L.C. Rich. in Mém. Mus. Par. IV (1819) 60; Ldb. Fl. Ross. IV, 52; Shmal'g., Fl. II, 447; Kryl., Fl. Zap. Sib. III, 713.—Ophrys Loeselii L., Sp. Pl. ed. 1 (1753) 947.—Malaxis Loeselii Sw. in Acta Acad. Holm. (1800) 235.—Sturmia Loeselii Rchb. Pl. Crit. IV (1826) 39.—Leptorchis Loeselii Mac Mill. Metasp. Minn. (1893) 173.—Ophrys lilifolia L. Sp. Pl. ed. I (1753) 946 p.pt.—O. trigona Gilib. Exerc. phyt. II (1792) 488.—Ic.: Flora Ross. Austr. Or. III (19) Figure 216; Rchb. Ic. Fl. Germ. XIII (1851) t. 140.—Exs.: HFR No. 80.

Perennial, 8–20 cm tall; leaves 2, oblong or elliptic-lanceolate, attenuate to an obtuse apex, subopposite, 4–11 cm long, 1.2–2.5 cm broad, borne at the base of scape, gradually narrowed at base into a winged petiole, this a quarter to one-half the length of the blade; racemes 2–10-flowered, 1.5–6 cm long; bracts hyaline, small, ovate-lanceolate, much shorter than ovary with pedicel; flowers yellowish-green; sepals ligulate-lanceolate, obtuse, minutely auriculate at base, 3-nerved, 5–6 mm long and 1.75–2 mm broad; petals recurved, narrowly linear, ca. 1 mm

* From the Greek liparos, fat, alluding to the greasy luster of the leaves.

broad, 1-nerved; lip elliptic or oval, with a small semioval tubercle at the narrow base, slightly undulate at the margin, obtuse, slightly enlarged below the middle and there 2.3 mm broad, about as long as the petals and sepals; column ca. 2.5 mm long. June (July). (Plate XXXVII, Figure 8).

Peat bogs. — European part: Lad.-Ilm., U. V., V.-Dnp., M. Dnp., L. Don,
603 Transv., V.-Ka.; W. Siberia: Ob, Irt.; Centr. Asia: Balkh. (valley of central part of Ili River). Gen. distr.: Scand., Centr. Eur., Bal.-As. Min. (W. part of the region), W. Med., Atl. Eur., N. Am. Described from Sweden. Type in London.

2. **L. japonica** (Miq.) Maxim. in Bull. Ac. Sc. Pétersb. XXXI (1887) 102; Kom. Fl. Mansh. I (1901) 531. — *Microstylis japonica* Miq. in Ann. Mus. Lugd.-Bat. II (1865–1866) 203. — *Leptorchis japonica* O. Ktze. Rev. Gen. (1891) 671. — Ic.: Somoku Dzusetsu, ed. Makino (Iconogr. Pl. Nippon.) XVIII (1912) t. 67. A. fig. sinistra.

Perennial, (15) 20–45 cm tall; leaves 2, ovate or elliptic, obtuse, 6.5–14 cm long, 3.5–7 cm broad, narrowed at base into a winged petiole to 7 cm long; raceme loose, 3.5–9 (15) cm long; bracts small, oval, obtuse; flowers yellowish-green; median sepal ovate-lanceolate, obtuse, 6–6.5 mm long and 2–2.5 mm broad; lateral sepals 6.5–7 mm long, 2.5 mm broad, inequilateral, 3-nerved; petals linear, obtuse, 7 mm long, 0.75 mm broad, 1-nerved; lip greenish, 6.5–7 mm long, 5–6 mm broad, cuneate-obovate, very slightly crisped-wavy on the margin; column curved, 3.5 mm long. June-July.

Deciduous woods. — Far East: Uss. Gen. distr.: Jap.-Ch. Described from Japan. Type in London.

3. **L. Makinoana** Schlechter in Fedde Repert. sp. nov. Beihefte IV (1919) 63. — *L. lilifolia* auct. fl. jap.; Kom. Flora Mansh. I (1901) 532 p. pt.; Kränzlin, Orch. Sib. Enum. in Fedde, Repert. Beih. LXV (1931) 89, non Rich. — Ic.: Somoku Dzusetsu, ed. Makino (Iconogr. Pl. Nippon.) XVIII (1912) t. 67. A, fig. dextra.

Perennial, 11–23 cm tall; leaves asymmetrically elliptic or oval-oblong, gradually narrowed at base into a petiole, obtuse to subobtuse, 6–12 cm long, 2–3.5 cm broad; raceme rather loose, to 10 cm long; bracts small, acuminate, 1–1.5 mm long; sepals greenish; median sepal lanceolate, obtusish, auriculate at base, 8–11 mm long, set at a right angle to ovary; lateral sepals 8–10 mm long, inequilateral, distinctly auricled at base; petals narrowly linear, obtusish, purple, lip arched-pendulous, wine-red, round-tipped and mucronate, (0.9) 1–1.1 cm long, 7–8 mm broad; column curved, 4–5 mm long, greenish. June-July. (Plate XXXVII, Figure 7).

Deciduous woods. — Far East: Uss. Gen. distr.: Jap.-Ch. Described from Japan (Hokkaido-Nakamura). Type in Berlin.

Note. Closely resembling the North American *L. lilifolia* (L.) Rich., but distinguishable by the distinct auricles at the base of sepals. Schlechter also indicates as a distinguishing feature the less curved
604 column. The Japanese plant is characterized in fact by the slightly curvature of the gynostemium, while Soviet Far East specimens are related in this respect to *L. lilifolia*. Nakai (Bot. Mag. Tokyo XLV (1931) 107) separated these plants as a distinct variety, var. *koreana* Nakai, distinguished by the narrower leaves and labellum. It is possible that the native plant may prove to be a species distinct from the Japanese.

Genus 314. **CALYPSO** * SALISB.

Salisb. Parad. Lond. (1807) t. 89, non Thouars (1805); Cytherea Salisb. Trans. Hort. Soc. 1 (1812) 301.

Flower solitary, large; sepals and petals ascending and arched-spreading, linear-lanceolate, 3-nerved, all alike but the lateral sepals slightly inequilateral; lip turned downward, saccate, slipper-shaped and narrowed toward apex, biparted, a flat petaloid ascending appendage in front of the orifice covering the narrowed biparted tip of the slipperlike part, the base of the appendage furnished with 3 tufts of hairs; column petaloid, ovate, broadly winged on both sides, cylindrically thickened at center; anther free, pendent, covered with the membranous process of the column; pollinia 2-parted, ovoid-cuneate; beak 3-toothed; ovary straight on a slightly twisted pedicel.

1. **C. bulbosa** (L.) Rchb. f. Ic. Fl. Germ. XIII (1851) 138; Turcz. Fl. baic.-dah. II, 2, 175; Kryl., Fl. Zap. Sib. III,. 716. — *Cypripedium bulbosum* L., Sp. Pl. ed. 1 (1753) 951. — *Cymbidium boreale* Sw., Now. Acta Ups. (1799) 76. — *Calypso borealis* Salisb., Parad. Lond. (1807) t. 89; Ldb. Fl. Ross. IV, 52; Shmal'g., Fl. II, 447;; Kom. Fl. mansh. I (1901) 532. — Ic.: Rchb. Ic. Fl. Germ. XIII tab. 137. — Exs.: HFR No. 491, 2664.

Perennial; tuber clothed with membranous sheaths, with cordlike roots below; stem 8–20 cm long, with 2 membranous sheaths; leaf solitary from the upper part of the tuber, ovate to ovate-elliptic, acuminate, dark green above, paler beneath, the blade 2.3–4 cm long, 1.5–3 cm broad, the petiole
607 1.5–7 cm long; flower subtended below the pedicel by a linear-lanceolate bract; sepals and petals dark pink, acuminate, 1.2–1.5 cm long, 2.5–3 mm broad; lip 1.5–1.9 cm long, the saccate part whitish or yellowish, variegated with reddish-brown stripes and speckles, the petaloid appendage pink with yellow hairs at base; column to 1 cm long and 0.8 cm broad, pink. May-June. (Plate XXXVII, Figure 9, a).

Shady and mossy coniferous woods. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., V.-Ka., U. V., V.-Don; W. Siberia: Ob; E. Siberia: Ang.-Say., Yen., Dau., Lena-Kol.; Far East: Ze.-Bu., Uss., Uda, Okh., Sakh. Gen. distr.: Scand., Mong., Jap.-Ch. Described from Lapland. Type in London.

Note. Replaced in North America by a closely related species, *Calypso americana* R.Br. which differs in the darker spots on the saccate part of the lip and a commonly violet-spotted lip appendage. The species growing in Japan is *C. speciosa* Schlechter, in which the lobes of the inflated part of the lip are longer than the petaloid appendage.

Genus 315. **EPHIPPIANTHUS** ** RCHB.

Rchb. f. in F. Schmidt, Reis. Amurl. (1868) 180.

Inflorescence 2–5-flowered; flowers pendulous; sepals and petals oblong-elliptic, obtuse, 3-nerved, subequal, the petals slightly shorter; lip oblong-ligulate, turned downward, short-clawed, with very short broad obtuse

* A mythological name.

** From Greek *ephippion*, saddle, and *anthos*, flower.

Plate XXXVII

1–2. Cypripedium macranthum Sw., flower.— 3. C. guttatum Sw., flower.— 4. C. Yatabeanum Makino, flower.— 5. Malaxis paludosa (L.) Sw., flower.— 6. Microstylis monophyllos Lindl., flower.— 7. Liparis Makinoana Schlechter, flower.— 8. L. Loeselii L.C.Rich., flower.— 9. Calypso bulbosa Rchb. f., 9a) column.— 10. Ephippianthus Schmidtii Rchb. f., flower.— 11.— Corallorhiza trifida Chatel., rhizome and flower analysis.

auricles on both sides of the base and a small 2-lobed swelling above; column arched-recurved, slender; anther terminal, mitriform; pollinia 4, round; ovary glabrous, borne on a slightly twisted pedicel. A small plant with a filiform creeping rhizome, the short slender stem bearing at base a solitary oval petiolate leaf.

1. **E. Schmidtii** Rchb. f. in F. Schmidt, Reis. Amurl. (1868) sub. tab. 5 et in Flora LI (1868) 33. — E. sachalinensis Rchb. f. in F. Schmidt. l. c., p. 180. — Ic.: Rchb. f. Xenia Orch. II (1873) t. 180. — Exs.: HFR No. 2376.

Perennial; stem 10–16 cm long, with 2 transparent sheaths; leaf obtuse, reticulately nerved, 1.3–2.5 cm long, 1–2.3 cm broad, the petiole 1–2.5 cm long; flowers greenish, scattered; bracts very small, 1 mm long, obtuse, slightly crenulate at apex, semitransparent, shorter than pedicel; sepals and petals 4.5–5.5 mm long, 1.75–2.25 mm broad; lip as long, 2–2.5 mm broad, obtuse; column 3.5–4 mm long. July-August. (Plate XXXVII, Figure 10).

Coniferous woods. — Far East: Sakh., Uss. **Gen. distr.**: Japan. Described from Sakhalin.

608 Genus 316. **CORALLORHIZA** * HALL.

Haller. [Enum. stirp. Helv. I (1742) 278] Hist. II (1768) 159.

Flowers more or less nodding; dorsal sepal and petals united into a hood and only slightly spreading; lateral sepals spreading downward and united at base by means of a tubercle; lip turned downward, oval, obtuse, narrowed toward base, with an obtuse tooth on each side below the middle; column elongated and recurved; anther caducous, subreniform; pollinia 4, a pair superposed in each locule, asymmetrically obovoid; beak laminate, short and broad; ovary straight on a twisted pedicel. Perennial leafless plants with a fleshy coralloid rhizome destitute of root fibers.

1. **C. trifida** Chatel., Sp. inaug. Coroll. (1760) 8. — Ophrys corallorhiza L., Sp. Pl. ed. I (1753) 945. — Corallorhiza Neottia Scop. Fl. Carn. ed. 2, II (1772) 207; Kryl., Fl. Zap. Sib. III, 717. — C. innata R. Br. in Ait. Hort. Kew. ed. 2, V (1813) 309; Ldb. Fl. Ross. IV, 49; Turcz. Fl. baic.-dah. II, 2, 173; Shmal'g., Fl. II, 447. — C. Corallorhiza Karst. Deutsch. Fl. (1883) 448. — Ic.: Rchb. f. Ic. Fl. Germ. XIII (1851) t. 138. — Exs.: HFR No. 234.

Perennial; rhizome buried, whitish, coralloid with short divisions; stems erect, slender, glabrous, yellowish, 10–25 (30) cm long, with 2–4 membranous sheaths; raceme loosely 2–10-flowered, 2–8 cm long; bracts small, lanceolate, acuminate, 1.5–2 mm long, much shorter than the short-pediceled ovary; flower nodding, glabrous; sepals and petals oblong-lanceolate, obtusish, 1-nerved, 4–6 mm long, yellowish-white or greenish-white, the tips sometimes reddish-brown; lip slightly shorter than to about as long as sepals and petals 3-lobed below the middle, the lateral lobes minute and toothlike, the terminal lobe large, whitish, with 2 longitudinal reddish stripes and speckles near the base. In var. ericetorum (Drej.) Rchb. f., the lateral lobes of the lip are

* From Greek corallion, coral, and rhiza, root.

imperceptible and the plant as a whole is characterized by a squat growth habit and small flowers. June. (Plate XXXVII, Figure 11).

Damp woods; in the polar-arctic region in meadows and in tundra. — Arct.: Arct. Eur.; European part: Kar.-Lap., Dv.-Pech., V.-Ka., U. Dnp., M. Dnp., Lad.-Ilm., U. V., V.-Don, Crim.; Caucasus: Cisc., Dag., E. Transc.; W. Siberia: Arct. Sib., U. Tob., Irt., Ob, Alt.; E. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Ze.-Bu., Okh., Kamch.; Centr. Asia: Dzu.-Tarb., T. Sh. **Gen. distr.**: Scand., Atl. Eur., W. Med., Centr. Eur.: Bal.-As. Min. (W. part of the region), Mong., Jap.-Ch., N. Am. Described from N. Europe. Type in London.

609 Genus 317. **OREORCHIS** * LINDL.

Lindl. in Journ. Linn. Soc. III (1859) 26.

Flowers nodding; sepals and petals distinct, similar, lanceolate, obtusish, 5–7-nerved; lip as long as the sepals and petals, turned downward, 3-lobed, the lateral lobes small and linear, the middle lobe large and broad, the base of the lip with 2 keel-like lamellae; spur none; column long and slender; anther terminal; pollinia 4, hemispherical; ovary straight on a slightly twisted pedicel. Plants with rhizomelike ovaloid tubers; leaves solitary, linear-lanceolate, arising from the top of the tuber; stems leafless, with 2 obtuse membranous sheaths, terminating in a many-flowered raceme.

1. **O. patens** Lindl. in Journ. Linn. Soc. III (1859) 27; Kom. Fl. Mansh. I (1901) 533. — *Corallorhiza patens* Lindl. Gen. and Sp. Orch. (1840) 535. — *Oreorchis lancifolia* A. Gr. in Mém. Acad. Art. et Sc. Bost. (1859) 400. — Ic.: Kom. and Alis., Opred. rast. Dal'nevost. kr. (1931), Plate 126.

Perennial; rhizome to 1.5 cm thick, covered with dead brown membranous sheaths; leaf solitary, ensiform, acuminate, 18–20 (25) cm long, (1) 1.5–2.5 cm broad, rigid; stem glabrous, 20–40 cm long, with 2 sheaths to 4.5 cm long; raceme 9–24-flowered, loose, 9–16 cm long, without a terminal flower; bracts ovate-lanceolate, 3.5–4.5 mm long, much shorter than ovary with pedicel; sepals and petals greenish-yellow, sometimes with reddish-violet speckles near apex, lanceolate, obtuse, the lateral slightly inequilateral, 8–9 mm long, 2.25–2.5 mm broad; lip 8–9 mm long, cuneate-obcordate, whitish dotted with reddish-violet, 3-lobed, the linear lateral lobes 3.5 mm long, the crisp-margined and slightly emarginate median lobe to 6.5 mm broad; column slightly arched-recurved, 4.5 mm long. June-August.

Shady mixed woods. — Far East: Uss., Sakh., Kamch. **Gen. distr.**: Jap.-Ch. Described from "Siberia". Type in Kew.

TRIBE III. **CYRTOPODIEAE** PFITZER.

Pfitzer. Entw. Natur. Anordn. Orch. (1887) 102.

Stamen 1; anther terminal, attached at base; pollinia waxy, compact, short-stalked; lip spurred.

* Meaning in Greek the mountain orchid.

Genus 318. **EULOPHIA** R.BR.

R. Br. in Bot. Reg. (1823) t. 686.

Sepals and petals distinct, spreading, lanceolate to broadly lanceolate,
610 acuminate, the median sepal obtuse; lip drooping, short-spurred, 3-lobed or rarely entire, the upper surface with prominent crestlike entire or fringed lamellae on the median nerves; column elongated, concave inside, marginate; anther terminal, with a small entire hornlike dorsal process above; pollinia 1, waxy; beak short. Terrestrial or rarely epiphytic plants with leafless scapes covered with numerous membranous sheaths and separate leafy shoots arising from the tuber or rarely the stem normally leafy in lower half (in tropical species).

1. **E. turkestanica** (Litw.) Schlechter in Fedde, Repert. sp. nov. XII (1913) 374. — Kränzlin. Orch. Sib. Enum. in Fedde Report. Beih. t. LXV (1931) 92. — Limodorum turkestanicum Litw. in Trav. Mus. Bot. As. Sc. Petersb. I (1902) 18. — Ic.: Fedchenko, Rastit. Turk. (1915), Figure 169. — Exs.: HFR No. 1894.

Perennial; leafy shoots with narrow linear rigid grasslike leaves; stem 25–45 cm long, 2.5–5 mm thick, with numerous pointed membranous sheaths 1.6–3.5 cm long; raceme many-flowered, loose, to 22 cm long; bracts lanceolate, long-acuminate, 1.2–1.5 cm long, about as long as ovary with pedicel; flowers nodding, bright yellow; pedicels 7–10 mm long; sepals 1.3–1.6 cm long and up to 4 mm broad, the median sepal narrow and obtuse; petals resembling the sepals but slightly shorter, not exceeding 1.5 cm; lip with basal spur 5–5.5 mm long, concave. 1.5 cm long, 0.8–0.9 cm broad, 3-lobed; terminal lobe obtuse, 5 mm long and as broad; back part of lip in dry flowers pinkish with dark veins, the median nerves gradually enlarged from base into fringed bearded lamellae, these most prominent and dissected on the terminal lobe; column to 7 mm long. April-May.

Tugai. — Centr. Asia: Pam.-Al. Described from banks of Amu Darya, near Farab. Type in Leningrad.

TRIBE IV. **NEOTTIEAE** LINDL.

Lindl. Orch. Scel. (1826) 7.

Stamen 1; anther terminal, attached at base; pollinia commonly stalkless, with powdery pollen; rhizomatous plants.

Genus 319. **POGONIA*** JUSS.

Juss., Gen. (1789) 65.

Flowers large, solitary (rarely 2 or 3); sepals and petals free, alike;
611 lip straight, 3-lobed, the margins of the large median lobe more or less fringed-bearded; column long, clavate; beak short; pollinia not stalked, with powdery pollen; ovary oblong.

* From Greek pogon, beard.

1. P. **japonica** Rchb. f., Linnaea XXV (1852) 228. — P. similis Blume, Orch. Arch. Ind. (1858) 148. — P. ophioglossoides Nutt. var. japonica Maxim. in herb. — P. ophioglossoides A.Gr., Mem. Amer. Acad. VI (1859) 409; Kom., Fl. Manshur. I (1901) 522 (nec Nutt.). — Ic.: Blume l.c. tab. 32 et 54 A.

Perennial; roots slender, spreading in a cluster; stem solitary, 10–15 (30) cm long, glabrous, 1-leaved; leaf borne at the middle of stem, linear-lanceolate to lanceolate, 3.5–8 cm long, 0.5–1 cm broad, acuminate; flower solitary, bright pink, subtended by a foliaceous bract 1.5–4 cm long; sepals 0.3–0.4 cm broad; petals 0.5–0.6 cm broad; sepals and petals oblong-ovate to ovate-lanceolate, equal, 1.5–2 (2.3) cm long; column 0.8–1.1 cm long, June-July. (Plate XXXVIII, Figure 14, a, b,).

Wet meadows. — Far East: Uss., Ze.-Bu., Uda. Gen. distr.: Jap.-Ch. Described from Japan.

Genus 320. **LISTERA** * R.BR.

R. Br. in Ait. Hort. Kew. ed. 2, V (1813) 201, nomen conservadum. — Diphryllum Rafin, Med. Rep. N. York. V (1808) 356.

Sepals and petals subequal, 1-nerved, obtusish; lip 2–3 times as long as sepals and petals, drooping, spurless, flat, deeply 2-cleft at summit; column short, straight; beak straight, slightly notched; anther overlying the beak; pollinia 2-lobed, stalkless, adherent to a small gland secreting at the touch a droplet of viscid liquid which congeals in retinaculum. Plants with slender roots and a pair of subopposite stem leaves; flowers greenish or yellowish-green, the petals sometimes dingy purple.

1. Raceme many-flowered, 10–25 cm long; petals strongly twisted; leaves elliptic-ovate, large, 6–14.5 cm long, 2.8–9 cm broad. . . . . 1. L. ovata (L.) R.Br.
+ Raceme smaller, (3) 4–12-flowered, 2–8.5 cm long; pedicels not twisted or very slightly twisted; leaves cordate or cordate-reniform, 1–3 cm long and about as broad . . . . . 2.

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2. Lip parted to the middle into 2 narrow linear-lanceolate gradually acuminate lobes; bracts very small, 1–1.5 mm long, ovate; pedicels 2–2.5 mm long. . . . . 2. L. cordata (L.) R.Br.
+ Lip parted at apex into 2 broad obtuse lobes; bracts larger, 2–4 mm long; pedicels 4.5–8 mm long . . . . . 3.
3. Lip with a tooth on each side at base; pedicels glabrous; leaves mucronate, bright green, lustrous . . . . . 3. L. **brevidens** Nevski.
+ Lip not toothed at base; pedicels pubescent; leaves obtuse, dull green. . . . . 4. L. **major** Nakai.

1. L. ovata (L.) R.Br. in Ait. Hort. Kew. ed. 2, V (1813) 201; Ldb. Fl. Ross. IV, 80; Boiss. Fl. Or. V (1884) 92; Kryl., Fl. Zap. Sib. III, 708. — Ophrys ovata L. Sp. pl. ed. 1 (1753) 946. — Diphryllum ovatum Beck, Glasn. IX (1903) 229. — Ophrys bifolia Gilib. Exerc. phytol, II, 486. — Ic.: Rchb. Ic. Fl. Germ. XIII et XIV (1851) tab. 127; Syreishch., Ill. Fl. Mosk. gub. (1906) 267. — Exs.: Fl. Aust.-Hung. No. 1846.

* Named for Martin Lister (1638–1712), physician to Queen Anne of England, one of the earliest investigators of fossils.

Perennial; rhizome short, rather thick, densely beset with roots; stem 25–60 cm long, below the leaves glabrous, thicker, brown-sheathed, above the leaves covered with short glandular hairs and bearing 1–3 minute rudimentary leaflets; leaves narrowed toward base, sessile, amplexicaul at base, obtuse or mucronate; bracts 3.5–5 mm long, ovate-lanceolate, acuminate; pedicels 4–6 mm long, covered with glandular hairs; sepals and petals green, 4–(4.5) mm long; sepals ovate; petals narrowed, linear-oblong; lip yellowish-green, obcuneate, 0.7–1 (1.1) cm long, cleft nearly to the middle into 2 linear-oblong lobes. June-July.

Damp forest meadows; glades in deciduous and mixed woods.— European part: Kar.-La., Dv.-Pech., V.-Ka., U. Dnp., Lad.-Ilm., U.V. M. Dnp., V.-Don, Transc., Crim., Caucasus: W. and E. Transc., Cisc., Tal.; Siberia: U. Tob., Ob, Ang.-Say.; Centr. Asia: T.Sh. Gen. distr.: Scand., Centr. Eur., Atl. Eur., W. Med., Bal.-As. Min. Described from Europe. Type in London.

Note. In Mologa River basin (Upper Volga region) village girls make use of the plant as rouge for their cheeks. For this purpose the roots are dissolved into a mass which is rubbed into the cheeks and brings out a bright and long-persisting glow. The plant also finds application in folk medicine against children's rashes.

613 2. L. cordata (L.) R. Br. in Ait. Hort. Kew. ed. 2, V (1813) 201; Ldb. Fl. Ross. IV, 80; Boiss. Fl. Or. V (1884) 92; Shmal'g., Fl. II, 199; Kryl., Fl. Zap. Sib. III, 709.— Ophrys cordata L. Sp. pl. ed. 1 (1753) 946.— Cymbidium cordatum Londes, Mem. Soc. Nat. Mosc. I (1811) 283.— Duphryllum cordatum O. Ktze., Rev. Gen. Pl. II (1891) 659.— Ic.: Rchb. Ic. Fl. Germ. XIII–XIV (1851) t. 128; Syreishch., Ill. Fl. Mosk. gub. I (1906) 267.— Exs.: HFR No. 235a.

Perennial; rhizome slender, creeping; stem (4.5) 6–15 (22) cm long, with 1 or 2 brownish sheaths at base and with 2 subopposite leaves near the middle, slightly glandular thinner and devoid of rudimentary leaflets above the leaves; leaves sessile, cordate-ovate, often nearly triangular, mucronate, thin, paler beneath, 1–2.5 cm long and as broad at base; raceme rather loosely 4–12-flowered, 2–3.5 (5) cm long; sepals and petals equal, 2–(2.5) mm long, oblong-elliptic, obtuse; lip twice the length of sepals and petals, 3.5–4.5 mm long, obcuneate, with a lanceolate tooth on each side at base; sepals green; petals and lip dingy purple. June-July (August). (Plate XXXVIII, Figure 3 a, b,).

Shady coniferous and mixed woods.— European part: Kar.-Lap., Arc. Eur.; Dv.-Pech., V.-Ka., Lad.-Ilm., U.V., U. Dnp.; Caucasus: Cisc., W. and E. Transc.; W. Siberia: Ob; E. Siberia: Ang.-Say., Lena-Kol. (reported by Gmelin for Lena); Far East: Kamch., Sakh., Uda, Uss. (N. part of the region). Gen. distr.: Scand., N. Eur., Bal.-As. Min., W. Med., Atl. Eur., N. Am., Jap. Described from N. Europe. Type in London.

Note. The plant Listera nephrophylla, described by Rydberg from the Rocky Mountains, belongs apparently to the same series as L. cordata, but its position has not so far been sufficiently clarified. It differs evidently from L. cordata in its reniform leaves and a distinct small tooth at the bottom of the sinus between the apical lobes of the lip.

3. **L. brevidens** Nevski in Acta Inst. Bot. Acad. Sc. URSS, ser. I, II (1935). — L. Savatieri Kom. (non Maxim.) in A.H.P. XX (1901) 526, ex parte. — L. Eschscholtziana Maxim. in Mém. pres. Acad. Sc. Pétersb. IX (1859) 269, non Chamisso in Linnaea III, p. 33. — L. Smallii Wiegand in Bull. Torr. Bot. Cl. XXVI (1899) 169, ex parte.

Perennial; rhizome slender, little creeping; stems erect, 15–23 cm long, slightly glandular-pubescent and without rudimentary leaflets above the leaves, glabrous and furnished with 1 (or 2) brownish sheath below the leaves; leaves 2, opposite, sessile, cordate-reniform or ovate-deltoid, mucronate, lustrous, 1.7–2.6 cm long, 1.8–3.6 cm broad; raceme rather
614 loosely 5–12-flowered, 3–8 cm long; flowers yellowish-greenish; pedicels glabrous, 4.5–8 mm long; bracts 3 mm long; sepals and petals oval-lanceolate, obtuse, 3–4 mm long; lip about twice the length of sepals and petals; 0.5–0.65 cm long, obcordate, 2-lobed at apex, with a small tooth at the bottom of the sinus between the 2 lobes, 4–5 mm broad near apex, with a small tooth (0.6–1 mm long) on each side at base; column 1.5–1.75 mm long. July-August. (Plate XXXVIII, Figure 1, a, b).

Shady spruce and fir forests. — Far East: Uss., Uda. Endemic. Described from Yana Range (Khabarovsk District). Type in Leningrad.

Note. The series of L. brevidens also includes the North American species L. Smallii Wieg. s. str. (L. reniformis Small., Bull. Torr. Bot. Cl. XXIV (1897) 334, non Don, Prod. Fl. Nep. (1825) 28) which is distinguished by the consistent presence of a small rudimentary leaflet above the pair of normal leaves as well as large flowers. The Japanese L. nipponica Makino (L. Savatieri Maxim. ex parte) differs in having larger teeth at base of labellum.

4. **L. major** Nakai in Bot. Mag. Tokyo, XXVIII (1914) 327. — L. Savatieri Maxim. ex Kom. in A.H.P. XX (1901) 526 ex pte; Kraenzlin, Orch. Sib., Journ. Russ. Bot. (1921) 46, p.p.

Perennial; rhizome slender, creeping only slightly; stems erect, 11–22 cm long, above the leaves more slender, slightly glandular and bearing 1 or 2 (3) rudimentary leaflets, below the leaves with 1 light brownish sheath; leaves 2, opposite, sessile, cordate, obtuse, dull green, 1.4–3 cm long, 1.6–3.2 cm broad; raceme loosely 4–9-flowered, 2.7–7.5 cm long; flowers greenish; pedicels pubescent, 5–7 mm long; bracts acuminate, 2–4 mm long; sepals and petals subequal, 2–2.5 (3) mm long, oval-lanceolate, obtusish; lip exceeding the sepals and petals, 7–10 mm long, oblong-obcordate, with a shallow sinus at apex between 2 obtuse lobes and there broadest (3–4.5 mm), narrowed toward base; column 1.75–2 mm long, July-August. (Plate XXXVIII, Figure 3, a, b,).
617 Shady spruce and fir forests. — Far East: Uss., Uda, Sakh., Ze.-Bu.; E. Siberia: Lena-Kol. (Aldan R. near mouth of Uchur). Gen. distr.: Jap.-Ch. Described from North Korea. Type in Tokyo.

Note. A species closely related to L. major Nakai and belonging to the same series is L. puberula Maxim. which occurs in Kansu Province and is distinguished by its firm thickish leaves.

Plate XXXVIII

1. Listera brevidens Nevski, 1a) flower, 1b) flower analysis.— 2.— L. cordata (L.)R. Br. flower.— 3. L. major Nakai, 3a) flower, 3b) flower analysis.— 4. Neottia nidus avis (L.)Sw. flower, 4a) flower analysis, 4b) column.— 5. N. papilligera Schlechter, flower analysis.— 6. N. camtschatea (L.) Rchb. f. lowest flower of inflorescence (schematically, without pubescence).— 7. N. asiatica Ohwi, flower analysis (reversed).— 8. Cephalanthera epipactoides Fisch. et Mey., flower, 8a) lip.— 9. C. longibracteata Bl., flower with bract, 9a) lip with column and ovary (according to Blume).— 10. C. rubra (L.) L.C. Rich., lip.— 11. C. grandiflora (L.) Bab., flower with bract, 11a) lip.— 12. C. longifolia (Huds.) Fritsch., flower, 12a) lip.— 13. Epipactus Thunbergii A.Gray, flower, 13a) lip (according to Blume).— 14. Pogonia japonica Rchb. f., flower (two perianth segments bent down), 14a) lip with column, 14b) lip (according to Blume).

Genus 321. **NEOTTIA*** SW.

Swartz, Acta Acad. Holm. XXXI (1800) 224.

Sepals and petals subequal or the petals shorter, spreading, obtusish or acuminate; lip drooping and much longer than sepals and petals or (in N. asiatica Ohwi) upturned and short, always spurless, slightly concave at base, 2-lobed or rarely entire at apex; column commonly elongated, with a rather long beak; anther leaning over the beak; pollinia 2-lobed, with powdery pollen, joined by a common gland. Saprophytic plants, without developed leaves, destitute of chlorophyll, yellowish-brown in color; stems covered with brownish scales; flowers in loose or fairly dense raceme; ovary straight, on a more or less twisted pedicel.

1. Lip entire, pointed, shorter than sepals, 2–3 mm long. . . . . 4. N. asiatica Ohwi.
+ Lip 2-lobed at apex, exceeding the sepals and petals, 6–12 mm long. . 2.
2. Lip parted at apex into 2 straight, downward directed lobes. . . . . 3. N. camtschatea (L.) Rchb. f.
+ Lip parted at apex into 2 divergent and slightly falcately upward arching lobes . . . . . 3.
3. Lip (0.7) 0.8–0.9 cm long, the undivided part 3.5–4 mm long, the posterior part to 2.5 mm broad; column 3 mm long; rachis of inflorescence, pedicels and ovaries commonly densely covered with ferruginous-brown glandular hairs. . . . . 2. N. papilligera Schlechter.
+ Lip 1–1.2 cm long, the undivided part (4) 4.5–6 (6.5) mm long, the posterior part 3–5 (5.5) mm broad; column together with anther 3.5–4 (4.5) mm long; plants glabrous in all parts, rarely slightly glandular. . . . . 1. N. nidus-avis (L.) L.C. Rich.

Section 1. **NIDUS** Nevski. — Raceme in lower part loose, in upper part dense; lip drooping, parted at apex into 2 upward arching lobes; column 3–4.5 mm long; plants apparently dying off after fruiting.

618 1. **N. nidus avis** (L.) L.C. Rich. in Mém. Mus. Par. IV (1818) 59; Ldb. Fl. Ross. IV, 81; Boiss. Fl. Or. V (1884) 91; Shmal'g., Fl. II, 449; Kryl., Fl. Zap. Sib. III, 710. — Ophrys nidus-avis L. Sp. Pl. ed. 1 (1753) 945. — Ic.: Rchb. Ic. Fl. Germ. XIII–XIV (1851) t. 121. — Exs.: HFR No. 2043-a, 2043-b, Pl. Finl. exs. No. 581.

Perennial; plant pale grayish-brown or brown throughout; stems 25–45 cm long, solitary (specimens with a pair of stems rarely occurring), arising from rhizome densely beset with thick roots, these radiating and forming a nestlike ball; sheathing scales 3–5, brownish, 3–5 cm long; raceme (7) 9–18 (21) cm long, (1.8) 2–3 (3.5) cm broad; rachis, ovaries and pedicels glabrous or rarely sparsely covered with short glandular hairs (var. glandulosa Beck.); bracts linear-lanceolate, acuminate, 4–8 mm long, exceeding the pedicels, these twisted and 3–6 mm long; flowers brownish, with the fragrance of honey; sepals obovate or elliptic-subrhomboid, obtuse, 4–6 mm long, (2.5) 3–4 (4.5) mm broad; petals scarcely shorter than sepals; lip darker, grayish-brown, the undivided part oblong, the lobes cordate-oblong spreading round-tipped; ovary at anthesis 4–8 mm long, commonly glabrous. June-July. (Plate XXXVIII, Figure 4, a, b).

* From Greek neottia, nest.

Shady coniferous and mixed woods. — European part: Kar.-Lap.; Dv.-Pech., V.-Ka., Lad.-Ilm., U. Dnp., U. V., M. Dnp., V.-Don, Transv., L. Don, Crim.; Caucasus: Dag., E., S. and W. Transc., Cisc.; W. Siberia: Ob. Gen. distr.: Scand., Centr. Eur., Atl. Eur., W. Med., Bal.-As. Min. Described from Europe. Type in London.

2. N. papilligera Schlechter in Fedde, Repert, sp. nova. XVI (1920) 356. — N. nidus-avid var. manshurica Kom. in A.H.P. XX (1901) 528.

Perennial; tuber subhorizontal or ascending, cylindric, densely beset with roots; stems 2–4 or solitary, (16) 20–35 (45) cm long, clothed with 4 or 5 pale brownish sheathing scales 3–3.5 cm long; raceme many-flowered, (8) 9.5–12.5 (15) cm long, (1.5) 2–2.5 (2.8) cm broad, cylindric, the rachis densely covered with ferruginous-brown papillary hairs (rarely glabrous or nearly so: f. subglabra Nevski); bracts linear-lanceolate, hyaline, acuminate, the lower about equaling the ovary with pedicel, the upper much shorter (3–6 mm long); pedicels more slender than in N. nidus avis, (2.5) 3–5.5 (6) mm long, twisted; flowers resembling those of N. nidus avis, but somewhat smaller, brownish; sepals oblong, obtuse, minutely papillose on the outer surface; 4–5 mm long, 2.5–2.75 mm
619 broad; petals scarcely shorter, 1-nerved, glabrous; lip oblong at base, the undivided part 3.5–4 mm long and to 2.5 mm broad; lobes divergent, (4) 5–6 mm long, often crisped on the margin and sometimes emarginate; ovary at anthesis 4–5 mm long, densely covered with glandular papillary hairs, rarely glabrate. June-July. (Plate XXXVIII, Figure 5).

Dense coniferous forests. — Far East: Uss., Ze.-Bu., Sakh. Gen. distr.: Jap.-Ch. Described from Japan, Nikko-Hayakawa. Type in Berlin.

Section 2. APHYLLOPHRYS Nevski. — Raceme rather loose both in lower and upper part; lip drooping, parted at apex into 2 straight lobes; column 2.5–3 mm long. Perennial plants.

3. N. camtschatea (L.) Rchb. f. Fl. Germ. XIII–XIV (1851) 146. — Ophrys camtschatea L. Sp. Pl. ed. 1 (1753) 948. — Neottia nectarii labio bifido Halenius Pl. rar. Camtsch. (1750) 20, Figure 24. — N. camtschatica Spreng., Syst. Veg. III (1826) 707; Ldb. Fl. Ross. IV, 82; Turcz. Fl. baic.-dah. II, 185; Kryl. Flora Zap. Sib. III, 711. — Ic.: Rchb. l.c. t. 126.

Perennial; stems solitary or 2 or 3, slender, 15–30 (35) cm long, below the inflorescence glandular-pubescent, from a short rhizome densely beset with roots; sheathing scales 3 or 4, 2–3.5 cm long; raceme 5–10 (14) cm long, 1–1.8 cm broad, the rachis densely glandular; bracts ovate, 3–6 mm long, the lower short-acuminate, the upper subobtuse, shorter to barely longer than pedicel; pedicels glandular, 4–6.5 cm long, twisted; sepals and petals pale green, the darker lip dingy greenish; sepals oblong-ovate, obtusish, 3.5–4 mm long, ca. 1.5 mm broad, the lateral ones subfalcate; petals linear, narrower, obtuse, about as long as sepals, 0.5–1 mm broad; lip obcuneate, narrowed toward base, 6–9 (10) mm and to 3 mm broad, the obtusish lobes to 3 mm long, the margins densely beset with small whitish papillae; ovary glandular, at anthesis ca. 3.5 mm long. July. (Plate XXXVIII, Figure 6).

Shady coniferous or more rarely deciduous woods. — E. Siberia: Ang.-Say.; W. Siberia: Alt.; Centr. Asia: Dzu.-Tarb., Pam.-Al. Gen. distr.: Dzu.-Kash. Described from Siberia. Type in London.

Note. This plant was described by Halenius in "Plantae rariores Camschatcenses", (1750), p. 28, and like various other plants described in this work it does not occur in Kamchatka. N. camtschatea and the closely related N. listeroides Lindl., that are distinguished from all other species of the genus Neottia by the glabrate ovary and broader lip, are closest to species of the genus Listera in respect of the shape of inflorescence and the color and shape of flowers.

Section 3. LINDLEYANTHUS Nevski. — Raceme rather loose; lip entire, pointed, turned upward; column 0.75 mm long.

620 ; 4. **N. asiatica** Ohwi in Bot. Mag. Tokyo XLV (1931) 384. — N. micrantha Lindl., Gen. and Spec. Orchid. Pl. (1840) 458; Kom., Fl. Mansh. I (1901) 528, non La Llave et Lex. (1825).

Perennial, pale brown, glabrous; stems solitary or paired from the rhizome, 15–25 cm long, slender; sheathing scales 3–5, 1.5–4 cm long; raceme (4) 6.5–9 cm long, 8–10 mm broad; bracts lanceolate or ovate, subobtuse, 2–2.5 mm long, barely shorter than the pedicel; pedicels straight, not twisted, 2–3 mm long; flowers pale brownish; sepals linear-lanceolate, 3–4.5 mm long, 1 mm broad, strongly pointed, spreading; petals much shorter than sepals, 2–3 mm long; lip ovate, acuminate, slightly concave at base, shorter than sepals, 2–3 mm long, 1.25 mm broad; ovary at anthesis 2–3 mm long. May-June. (Plate XXXVIII, Figure 7).

Coniferous and mixed woods. — Far East: Uss., Kamch. Gen. distr.: Jap.-Ch. Described from "Siberia". Type in Kew.

Note. This species differs to such an extent from the generic type in flower shape, especially the upturned lip, that it seems to justify separation into a distinct genus together with two closely related species, N. acuminata Schlechter (Szechwan) and N. parviflora (King. et Pantl.) Schlechter (Himalayas).

Genus 321a. **HOLOPOGON** KOM. ET NEVSKIIN Addenda III, 750.

1. **H. ussuriensis** Kom. et Nevski in Addenda III, 751.

Genus 322. **EPIPACTIS*** ADANS.

Adans., Fam. II (1763) 70, nomen conservandum; Helleborine Hill., British Herbal (1756) 477.

Flowers nodding on short or fairly long twisted pedicels; sepals and petals somewhat spreading, the sepals slightly longer; lip spurless, oblong, divided by a deep constriction into a posterior gynochil and anterior epichil; gynochil commonly concave and cup-shaped, nectariferous from its bottom; epichil almost flat, with smooth or rugose tubercles or crests at base; column short; anther attached at base; pollinia asymmetrically

* Name used by Theophrastus for a plant resembling Helleborus (hence Helleborine).

pyriform, 2-parted, adherent to a small gland; ovary straight. Perennial plants with numerous green leaves.

1. Gynochil concave, with 2 obtuse lateral lobes; flowers rather large, the sepals and petals to 1.8 cm long; rhizome creeping, with long internodes (Section 1. Arthrochilium Irmisch.) . . . . . 2.

621 + Gynochil cup-shaped, thickened, without lateral lobes; flowers smaller, the sepals and petals to 1.4 cm long; rhizome abbreviated, short-creeping (Section 2. Euepipactis Irmisch.) . . . . . 5.

2. Gynochil about twice as broad as epichil (Series 1. Longifoliae Nevski) . . . . . 3.

+ Gynochil not broader than epichil . . . . . 4.

3. Gynochil with small warts in middle part; inflorescence rather loose, 3.5–12 (13) cm long; lower bracts to 5–7 cm long, exceeding the flower; ovary glabrous or nearly so . . . . . 1. **E. Thunbergii** A. Gray.

+ Gynochil without warts in middle part; inflorescence loose, 6.5–20 (24) cm long; lower bracts to 12–13.5 cm long, many times longer than flower; ovary papillose . . . . . 2. **E. Royleana** Lindl.

4. Gynochil oblong-navicular, with 2 lateral lobes at base (Series 2. Veratrifoliae Nevski) . . . . . 3. **E. veratrifolia** Boiss. et Hoh.

+ Gynochil slightly concave, with 2 obtuse lobes at its apex, narrower than the broadly oval epichil and joined to it by a very narrow bridge [mesochil] (Series 3. Palustres Nevski) . . . 4. **E. palustris** Crantz.

5. Callosities at base of epichil smooth or nearly smooth; flowers inodorous; sepals and petals 1–1.4 cm long (Series 4. Latifoliae Nevski) . . . . . 6.

+ Callosities at base of epichil rugose and crenulate; flowers scented; sepals and petals 7–8 mm long (Series 5. Rubiginosae Nevski) . . 7.

6. Leaves glabrous, smooth; epichil broadly ovate-cordate, 5–5.5 mm long and as broad . . . . . 5. **E. latifolia** (L.) All.

+ Leaves scabrous, densely beset on the nerves and margins with whitish papillae; epichil narrowly cordate, 4–5.5 mm long and (2.5) 3–3.5 mm broad . . . . . 6. **E. papillosa** Franch. et Sav.

7. Leaves small, much shorter than internodes, 1.5–3.5 cm long; flowers greenish-white, reddish-tinged . . . . . 8. **E. microphylla** (Ehrh.) Sw.

+ Leaves larger, 4–8 cm long, exceeding the internodes; flowers dark purple . . . . . 7. **E. rubiginosa** Crantz.

Section 1. **ARTHROCHILIUM** Irmisch in Linnaea XVI (1842) 451 et XIX (1846) 121, emend. noval (incl. sect. Megapactis et Cymbochilium Schlechter).

622 Series 1. **Longifoliae** Nevski.

1. **E. Thunbergii** A. Gray in Perry Exped. Jap. II (1856) 319. — Helleborine Thunbergii Druce in Bull. Torr. Bot. Cl. XXXVI (1909) 547. — Serapias longifolia Thbg. Flor. Jap. (1784) 28, non Huds. — Epipactis longifolia Bl., Orch. Arch. Ind. (1858) 185. — E. manshurica Maxim. ined. — E. gigantea Hook. var. manshurica Maxim. ex Komarov, Fl. Mansh. I (1901) 524. — Ic.: Blume l.c. t. 65, fig. D. 1–10.

Perennial; stems erect, sulcate, 40–90 cm long; short basal sheaths; leaves 4–8, ovate-lanceolate, acuminate, 8–16 cm long, 4–5.5 cm broad,

glabrous; inflorescence rather loosely 5–10-flowered; bracts green, broadly lanceolate, 1.6–3.3 cm long, the lower 5–7 cm long; sepals dingy brownish-green, oval-lanceolate, 1.2–1.6 cm long, 0.5 cm broad, acuminate, the lateral asymmetric; petals 1–1.5 cm long, oval, 0.65–0.7 cm broad, yellowish, the midvein purple-tinged; lip pale lilac; gynochil concave, expanded 1–1.1 cm broad, 0.6 cm long, the median part yellow-speckled and minutely warted, the 2 lobes turned to the front; epichil much narrower, 0.5 cm broad, 0.7 cm long, purple-violet, with 2 prominent ridges at base; column with anther 6 mm long. July. (Plate XXXVIII, Figure 13a).

Wet meadows. — Far East: Uss. Gen. distr.: Jap.-Ch. Described from Japan.

2. **E. Royleana** Lindl. in Royle, Illustr. Bot. Himal. (1839) 364. — Cephalanthera Royleana Rgl. in A.H.P. VI (1879) 490; Boiss. Fl. Or. V (1884) 85. — C. kokanica Rgl. in herb.

Perennial; stems erect, 30–95 cm long, with several basal sheaths; leaves 7–10, ovate-lanceolate, long-acuminate, glabrous, 7–19 cm long, 2.5–5.5 cm broad; raceme loose, 3–9-flowered, the flowers much more scattered than those of E. Thunbergii, the rachis papillose; bracts green, linear-lanceolate to linear, 2–5 (7) cm long, the lower to 12–13.5 cm long; sepals oval-lanceolate, acuminate, 1.6–1.8 cm long, 0.6–0.8 cm broad, brownish-green, the lateral asymmetric and falcate; petals oval, obtusish, 1.4–1.7 cm long, 0.7 cm broad, pinkish; lip brownish-red; gynochil concave, expanded 1.4–1.6 cm broad, 1 cm long, the 2 spreading obtuse lateral lobes adherent to column; epichil much narrower, 0.4 cm broad, 0.8–0.85 cm long; column with anther 0.7–0.8 cm long, June-July.

623 Wet meadows near mountain streams. — Centr. Asia: Pam.-Al. **Gen. distr.**: Ind.-Him. Described from the Himalayas. Type in Kew.

Note. In addition to E. Thunbergii and E. Royleana, this series also contains the North American E. gigantea Hook.

Series 2. Veratrifoliae Nevski.

3. **E. veratrifolia** Boiss. et Hoh. in Boiss. Diagn. Ser. I, fasc. XIII (1853) 11; Fl. Or. V (1884) 87. — Exs.: Th. Kotschy. Pl. Pers. bor. (1846) No. 401.

Perennial; stem (30–40) 50–100 cm long, erect, with 3 or 4 basal sheaths; leaves 6–10, oval-lanceolate to narrowly lanceolate, acuminate, glabrous, to 20 cm long and 4 cm broad; raceme erect, 1-sided, rather loosely 4–20-flowered, (10) 15–40 (45) cm long; the upper part of stem and rachis of inflorescence puberulous; bracts foliaceous, spreading, narrowly lanceolate, the lower many times the length of flower, the upper as long as or shorter than flower; ovary and pedicel pubescent; flowers nodding, greenish-purple; sepals narrowly oval, acuminate, 5-nerved, 1.3–1.6 cm long, slightly pubescent on the back, the lateral asymmetric; petals asymmetrically oval, obtuse, 1.2–1.5 cm long, glabrous, 5–7-nerved; lip about equaling the petals, 1.2–1.4 cm long, between the tips of gynochil lobes to 7 mm across; gynochil oblong-navicular, slightly attenuate from base, warty within; epichil oval, 3-lobed, 6–7 mm long, expanded ca. 5 mm broad; column straight, 5 mm long. June-July.

Wet meadows near mountain streams. — Caucasus: S. Transc. **Gen. distr.**: Iran., Arm.-Kurd., E, Med., Bal. As. Min. Described from Persia. Type in Geneva.

Note. This section, distinguished by the gynochil with lateral lobes at base, also contains the Himalayan E. consimilis Wallr.

Series 3. Palustres Nevski.

4. **E. palustris** (L.) Crantz. Stirp. Austr. (1769) 462; Ldb. Fl. Ross. IV, 82; Turcz. Fl. baic.-dah. II, 186; Boiss. Fl. Or. V (1884) 87; Shmal'g., Fl. II, 451; Kryl., Fl. Zap. Sib. III, 702. — Serapias Helleborine η. palustris L., Sp. Pl. ed. 1 (1753) 950. — Serapias palustris Mill. Gard. Dict. ed. 8 (1768) No. 3. — Arthrochilium palustre Beck., Fl. Nied. Oesterr. (1890) 212. — Ic.: Rchb. Ic. Fl. Germ. XIII-XIV (1851) 131. — Exs.: HFR No. 185; H. F. A. M. No. 350.

Perennial; stems 20–50 (70) cm long, glabrous in lower part, slightly pubescent above; leaves oblong to oblong-lanceolate, obtusish or acuminate, glabrous, 8–15 cm long and 2.5–3.5 (4) cm broad, the upper lanceolate,
624 smaller, resembling the bracts; raceme 6–15 (20) cm long, rather loose; bracts lanceolate, shorter than the nodding flowers except for the lowest, these equaling or exceeding the flower; sepals lanceolate to oval-lanceolate, acuminate, greenish, faintly striped within with dingy violet, 8–12 mm long, 3-nerved, sparsely puberulous on the back; petals narrowly oval, obtuse, glabrous, 3-nerved, slightly shorter than petals, whitish, in lower part with rather faint violet-pink stripes; lip 1–1.2 cm long, glabrous; gynochil slightly concave, pinkish-white outside, with orange papillae and pinkish-violet veins within, expanded 4.5–5.5 mm long and as broad between the lateral lobes; epichil broadly oval, white, 5.5–6.5 mm long, 5–6 mm broad, obtuse, slightly emarginate at apex, narrowed at base into the mesochil, this occupied by a protuberance divided by a longitudinal groove into 2 prominent ridges, the lobate lower margin of the protuberance yellow; column 4–5 mm long; ovary pubescent. June-July. (Plate XXXIX, Figure 5).

Wet boggy meadows. — European part: Kar.-Lap., Dv.-Pech., V.-Ka., Lad.-Ilm., U. Dnp., M. Dnp., V.-Don, Transv., L. Don, Bl., Crim.; Caucasus: Cisc., E., S. and W. Transc.; W. Siberia: U. Tob., Irt.; Ob, Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Dzu.-Tarb., T. Sh.: **Gen. distr.**: Scand., Centr. Eur., Atl. Eur., W. Med., Bal.-As. Min.; Dzu.-Kash. Described from Europe. Type in London.

Section 2. EUEPIPACTIS Irmisch. in Linnaea XVI (1842) 450 et XIX (1846) 113.

Series 4. Latifoliae Nevski.

5. **E. latifolia** (L.) All., Fl. Pedem. II (1785) 151; Ldb. Fl. Ross. IV, 83; Turcz. Fl. baic.-dah. II, 186; Boiss. Fl. Or. V (1884) 87; Shmal'g., Fl. II, 452; Kryl., Fl. Zap. Sib. III, 703. — Serapias Helleborine α. latifolia L. Sp. Pl. ed. 1 (1753) 949. — Serapias latifolia Willd.

Sp. Pl. 4 (1805) 83. — Epipactis pycnostachys C. Koch. in Linnaea XXII (1849) 289. — Ic.: Rchb. Ic. Fl. Germ. XIII–XIV t. 136. — Exs.: Fl. Hung. No. 1221.

Perennial; stems 35–80 (100) cm long, glabrous at base, sparsely pubescent above, 4–10-leaved; leaves oval to elliptic-lanceolate, obtuse or subobtuse, 5–9 cm long, 3–5.5 cm broad; raceme erect, more or less 1-sided, 10–40 cm long, many-flowered; bracts lanceolate or the lower ovate-lanceolate, green, the lower ones overtopping the flowers; sepals oval to oval-lanceolate, acuminate, commonly glabrous, greenish, 1–1.3 cm long; petals 0.9–1.1 cm long, elliptic-oval, pale green, the lower part more or less suffused with pinkish-violet; lip about the length of petals;
625 gynochil 5–5.5 mm long and broad, round, hemispherically saccate, glabrous and dark reddish-brown within, greenish with greenish-white margins outside; epichil 5–5.5 mm long and as broad, broadly cordate-ovate, greenish-white tinged with violet, slightly acuminate, with 2 smooth or nearly smooth protruberances at base; column ca. 3–3.5 mm long; ovary sparsely pubescent, together with pedicel 7–9 mm long. July-August. (Plate XXXIX, Figure 3).

Deciduous and mixed woods. — European part: Kar.-Lap., Dv.-Pech., V.-Ka., Lad.-Ilm., U. Dnp., U. V., V.-Don, Transv.; L. Don, M. Dnp., Bl., Crim.; Caucasus: S., E. and W. Transc., Dag., Cisc., Tal.; W. Siberia: U. Tob., Irt., Ob, Alt.; E. Siberia: Ang.-Say., Dau. (W. part); Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. Gen. distr.: Scand., Centr. Eur., Atl. Eur., W. Med., Bal.-As. Min., E. Med., Iran. Described from Europe.

E. latifolia All. × E. rubiginosa Crantz (= Epipactis Schmalhausenii Richter, Plant. Eur., I (1890) 284). Plants resembling E. latifolia in general habit (large ovate-lanceolate long-acuminate leaves of which the uppermost surpassing the base inflorescence, long bracts, and strongly drooping flowers); but approaching more closely E. rubiginosa as regards shape of gynochil and epichil and the time of flowering (reported by Schmalhausen (Fl. II, p. 452) for the former Peterburg Province).

Note. In his monumental monograph (1933), M. J. Godfrey, who applied himself for a number of years to the study of the genus Epipactis, records for the USSR (without precise indication of locality), in addition to E. latifolia, also E. violacea Durand Duquesnay. This species, according to Fleischman and Rechinger, should apparently be named E. varians Crantz. R. Schlechter (Monogr. u. Icon. Orch. Eur. I, 9–10 (1928) 272) calls it E. purpurata Smith and does not report it for the USSR. The features distinguishing E. varians from E. latifolia are the long vertical rhizome (in E. latifolia it is short and horizontal), narrow and often violet-tinged leaves, pubescent ovary, and even less bright colored flowers. It is possible that this plant actually occurs in the European part of the USSR, but the author has not come across specimens which he could list with certainty under this species. It should, however, be pointed out that Epipactis latifolia on USSR territory does not make the impression of a homogeneous entity, and it may have to be split in the future into several species.

6. E. papillosa Franch. et Sav. Enum. Pl. Jap. II (1879) 519. — E. latifolia var. papillosa Maxim. ex Komarov, Fl. Mansh. I (1901) 523. — Helleborine papillosa Druce in Bull. Torr. Bot. Cl. XXXVI (1909) 547. — Ic.: Miyoshi et Makino, Pocket-Atlas Alp. Pl. Jap. I (1906) t. 5, Figure 26.

626 Perennial; stems (30) 35–75 cm long, pubescent in upper half; leaves ovate-lanceolate, covered on the nerves on both sides and on the margin with small whitish papillae, scabrous, to 12–14 cm long and 3–6 cm broad, acuminate; raceme rather loosely many-flowered; bracts linear to linear-lanceolate, acuminate, rough on the margin due to whitish papillae, the lower one surpassing the flower; sepals oval-lanceolate, long-acuminate, 1–1.4 cm long, 3–5 mm broad, greenish; petals oval, 0.9–1.2 cm long, 4–6 mm broad, acuminate, greenish-pink; lip about the length of petals; gynochil round, saccately concave; epichil narrowly cordate, more pointed than in E. latifolia, 4–5.5 mm long and (2.5) 3–3.5 mm broad, with 2 inconspicuous smooth tubercles at base, the margins slightly undulate; ovary sparsely papillose; pedicels more or less pubescent. July-August. (Plate XXXIX, Figure 4).

Shady woods. — Far East: Kamch., Sakh., Uda, Uss. Gen. distr.: Jap.-Ch. Described from Hokkaido. Type in Paris.

Series 5. Rubiginosae Nevski.

7. E. rubiginosa Crantz, Stirp. Austr. VI (1769) 467. — E. rubigonosa "Gaud." ex Koch Syn. ed. 2, I (1844) 801. — Serapias atrorubens Hoffm. Deutschl. Fl. ed. 2, II, 1 (1804) 182. — Epipactis atrorubens Schultes, Oester. Fl. ed. 1 (1814) 538; Ldb. Fl. Ross. IV, 83; Boiss. Fl. Or. V, 88; Shmal'g., Fl. II, 452. — E. atripurpurea Rafin. Car. (1810) 87; Kryl., Fl. Zap. Sib. III, 707. — Ic.: Rchb. Ic. Fl. Germ. XIII-XIV (1851) t. 133. — Exs.: Fl. Austr.-Hung. No. 1845.

Perennial; stems 25–60 cm long, in upper part densely puberulous and often suffused with dingy violet; leaves 5–9, rigid and scaberulous, oval to oval-lanceolate, acuminate, exceeding the internodes, 4–8 cm long and 1.5–4 cm broad; raceme erect, 1-sided, 7 to upward of 20 cm long, the rachis densely pubescent; flowers dark purple, vanilla-scented; bracts lanceolate, the lower surpassing the flower; sepals ovate, acuminate, 3-nerved, sparsely puberulous outside, 6–7 mm long and 3 mm broad,
629 the lateral asymmetric; petals elliptic, slightly shorter; lip 5.5–6.5 mm long; gynochil saccate, 2.5–3 mm long and about as broad; epichil cordate-reniform, 3–3.5 mm long, 4–5 mm broad, mucronulate, obtusely crenulate on the margin, with 2 rugose tubercles at base; column not more than 2.5 mm long; ovary and pedicel densely pubescent. July. (Plate XXXIX, Figure 2).

Deciduous woods and stony (calcareous) mountain slopes. — European part: Kar.-Lap., Dv.-Pech., V.-Ka., U.V., U.-Dnp., Lad.-Ilm., M. Dnp., L. Don, Transv.; Caucasus: Cisc., E. Transc.; W. Siberia: U. Tob., Ob. Gen. distr.: Scand., Centr. Eur., W. Med., Bal.-As. Min. Described from Germany.

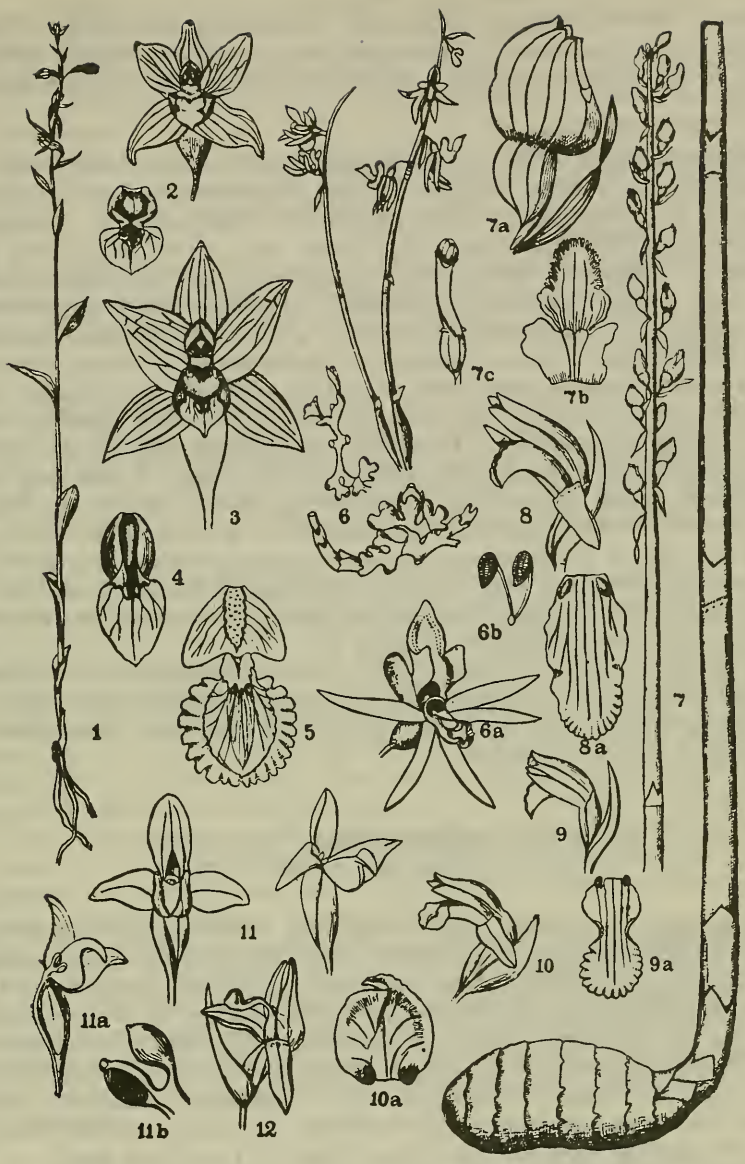

Plate XXXIX

1. Epipactis microphylla Sw.— 2. E. rubiginosa Crantz, flower and lip.— 3. E. latifolia All., flower.— 4. E. papillosa Fr. et Sav.— lip. 5. E. palustris (L.) Crantz, lip.— 6. Epipogon aphyllum Sw.: 6a) flower, 6b) pollinarium.— 7. Gastrodia elata Blume, 7a) flower, 7b) lip with part of perianth tube, 7c) column with anther.— 8. Spiranthes amoena (M.B.) Spreng., flower, 8a) lip.— 9. S. sinensis (Pers.) Ames., flower, 9a) lip.— 10. S. autumnalis L.C. Rich., flower, 10a) lip.— 11. Goodyera repens (L.) R. Br., flower, 11a) flower in section, 11b) column.— 12. Zeuxine strateumatica (L.) Schlechter, flower.

Note. The existing herbarium specimens from the Caucasus (Ladovskii — Mount Beshtau, Wilhelms — Imeretiya, Sredinskii — "in mountains of the Caucasus") raise doubts as to the correctness of location records. Confirmation is needed for the occurrence of this species in the Caucasus.

8. **E. microphylla** (Ehrh.) Sw. in Acta Acad. Holm. (1800) 232; Ldb. Fl. Ross. IV, 84; Boiss. Fl. Or. V (1884) 88; Shmal'g., Fl. II, 452. — Serapias microphylla Ehrh. Beitr. IV (1789) 42. — Ic : Rchb. Ic. Fl. Germ. XIII, XIV (1851) tab. 132. — Exs.: Fl. Austr.-Hung. No. 1472.

Perennial; stems 17–40 cm long, pubescent at the top; leaves 3–6, small, much shorter than the internodes, 1.5–3.5 cm long and to 0.9 cm broad, lanceolate or narrowly lanceolate, acuminate, the margin commonly minutely puberulous; raceme loosely 4–15-flowered, 1-sided, 3–12 cm long, the rachis densely pubescent; bracts lanceolate, acuminate, minutely puberulous, the lower ones the length of flower; flowers faintly clove-scented; sepals elliptic-oval, 3-nerved, subobtuse, puberulous, pale greenish tinged with red outside, whitish green within, 7 mm long; petals whitish-green, oval, acuminate, 5-nerved, glabrous, 5.5–6 mm long; lip with greenish-brown gynochil and whitish or whitish-pink epichil; gynochil saccate, 3.3 mm long and broad; epichil rounded-ovate, to 3.5 mm long and broad, obtusish, with crenate and slightly undulate margin, the base furnished with 2 rugose-warted elevations; ovary and pedicel densely pubescent. July. (Plate XXXIX, Figure 1).

Shady beech woods. — European part: Crim.; Caucasus: W. Transc., S. Transc. Report for Dagestan requiring confirmation. **Gen. distr.**: Scand., Centr. Eur., Atl. Eur., W. Med., Bal.-As. Min. Described from NW Germany. Type in Moscow.

630

Genus 323. **CEPHALANTHERA*** L. C. RICH.

L.C. Rich. in Mem. Mus. Par. IV (1818) 51.

Ovary sessile, cylindric, slightly twisted; sepals and petals similar, but petals slightly shorter and broader, the entire flower campanulate; lip with narrow constriction about the middle; gynochil concave, with oval-triangular lateral lobes, sometimes minutely spurred at base; epichil broadly oval or reniform, obtuse or pointed, with slightly undulate margins, with 3–7 crestlike lamellae or ridges above; column erect, together with anther 0.5–1.1 cm long; pollinia cylindric, 2-parted, stalkless. Plants with short horizontal or ascending rhizomes and rather densely leafy stems.

1. Lip prolonged at base into an obtuse spur (1) 1.5–3 mm long . . . . 2.
+ Lip concave at base, spurless . . . . . 3.
2. Leaves small, elliptic to ovate-lanceolate, 2.5–4 cm long; flowers pink; sepals and petals 1.5–2.2 cm long . . . . . 1. **C. epipactoides** Fisch. et Mey.
+ Leaves linear-lanceolate to lanceolate, 6–12.5 cm long; flowers white; sepals and petals 1–1.3 cm long . . . . . 2. **C. longibracteata** Bl.
3. Flowers pink; upper part of stem, pedicels, and ovaries puberulous; epichil pointed . . . . . 6. **C. rubra** (L.) L. C. Rich.

* From Greek cephale, head, and anthera, anther.

+ Flowers white; upper part of stem, pedicels and ovary always glabrous; epichil obtuse . . . . . 4.

4. Upper bracts very small, scalelike, 1–2 mm long; epichil on upper surface with 5–7 prominent keel-like lamellae; leaves linear-lanceolate to lanceolate . . . . . 4. **C. longifolia** (Huds.) Fritsch.

+ Bracts lanceolate to linear-lanceolate, the uppermost but slightly shorter than to equaling the ovary; epichil with 3 (very rarely 5) lamellae; leaves oval or elliptic, to 6.5 cm long and 3.3 cm broad. . . . . 3. **C. grandiflora** (L.) Babing.

++ Upper bracts linear-subulate, commonly half the length of ovary; epichil with 3 lamellae; leaves elliptic to oblong-elliptic, to 11 cm long and 5 cm broad; plant known only from the Talysh area . . . . . 5. **C. caucasica** Kränzlin.

631 1. **C. epipactoides** Fisch. et Mey., Ann. Sc. Nat. Sér. IV, 1 (1854) 30. — C. kurdica Bornm. et Kränzl., Bull. Herb. Boiss. III (1895) 143. — C. floribunda G. Wor., Monit. Jard. Bot. Tiflis X (1908) 22. — C. cucullata Grossh., Fl. Kavk. I (1928) 272, non Boiss. et Heldr. in Sched. Cret. (1847). — Ic.: Schlechter, Monogr. et Icon. Orch. Eur. (1928), t. 35, Figure 140.

Perennial; stems erect, (25) [?] 20–60 cm long; leaves small, glaucescent, elliptic, ovate or ovate-lanceolate; raceme erect, rather densely many-flowered, 6–20 (40) cm long and to 4.5 cm broad, the rachis sparsely and minutely papillose; sepals 1.9–2.2 (2.4) cm long, 0.4–0.6 cm broad, elliptic-lanceolate, obtusish, the dorsal 3-nerved, the lateral asymmetric and 5-nerved; petals shorter, 1.5–1.75 cm long, ovate, 5-nerved; lip 1.4–1.5 cm long; gynochil broadest between the lateral lobes and there 0.9 cm across, spurred at base, the spur 3 mm long; epichil broadly oval, obtuse, rounded at base, 0.8–1 cm long, 0.6–0.7 cm broad, with minutely papillose margin and 5 prominent crenulate ridges on the upper surface; column 0.7–0.8 cm long. May. (Plate XXXVIII, Figure 8 a).

Coppices and deciduous woods. — Caucasus: W. Transc. Gen. distr.: Arm.-Kurd., Bal.-As. Min. Described from Troy. *

Note. The plant first reported by Lipskii for the Caucasus under the name C. cucullata Boiss. et Heldr., occurs solely on the island of Crete. Lipskii recorded that the flowers of his specimens collected near Novorossiisk were yellowish-white, but this is difficult to verify with herbarium specimens. Should this fact be confirmed, one may have to consider these plants as representing a distinct race differing from the South Caucasus.

2. **C. longibracteata** Bl., Orch. Arch. Ind. (1858) 188. — C. erecta Kom. Fl. Mansh. I (1901) 523, non Blume. — Ic.: Bl. l.c. t. 65, Figure 3.

Perennial; stems erect or slightly flexuous, 35–50 cm long, densely leafy; leaves thin, green, 6–12.5 cm long, 1.7–3 (3.4) cm broad; inflorescence 5–9 (13) cm long, few-flowered, the rachis sparsely papillose; flowers relatively small, white, erect, 1–1.3 cm long (excluding ovary); lower bracts foliaceous, 6–9.5 cm long, linear, two or more times as long as the flower, the upper shorter, linear-subulate, as long as or

* [Troas, ancient region, on Menderes River, Turkey.]

shorter than ovary; ovary 1.1–1.5 cm long; sepals 1–1.2 cm long, the lateral asymmetric; lip with a constriction above the middle; gynochil
632 with 2 lobes, spurred at base, the spur 1–1.5 mm long; epichil oval, obtuse, the upper surface with 3 crested stripes on the upper surface; column 0.5–0.65 cm long. May-June. (Plate XXXVIII, Figure 9 a).

Deciduous woods. — Far East: Uss. Gen. distr.: Jap.-Ch. (Korea, Manchuria, Honshu, Hokkaido. Described from Japan.

3. **C. grandiflora** (L.) Babing. Man. Br. Bot. (1843) 296; Shmal'g., Fl. II, 151. — Serapias grandiflora L. Syst. ed. 12 (1767) 595. — Epipactis alba Crantz, Stirp. Austr. ed. II fasc. VI (1769) 360, excl. var. β. — Cephalanthere alba Simonk., Enum. Fl. Transs. (1886) 504. — Serapias pallens Jundz. Fl. Lithuan. (1791) 268. — C. pallens L.C. Rich. in Mem. Mus. Par. IV (1818) 60; Ldb. Fl. Ross. IV, 78; Boiss. Fl. Or. V (1884) 85. — Ic.: Rchb. Ic. Fl. Germ. XIII–XIV (1851) t. 119.

Perennial; stem erect, 20–60 cm long, glabrous; rhizome horizontal, short, densely beset with roots; leaves oval to elliptic-oval, acuminate or subobtuse, glabrous, the middle ones 4–6.5 cm long, 1.8–3.3 cm broad; inflorescence erect, to 12 cm long, loosely 3–8-flowered; lower bracts exceeding the flower, foliaceous, lanceolate to linear-lanceolate, acuminate; flowers erect or slightly spreading, glabrous, 1.5–2 cm long (excluding ovary); white; ovary glabrous, 1.1–1.3 cm long; sepals oblong to lance-oblong, obtusish, 5-nerved, (1.5) 1.7–2 cm long; petals obtuse, obovate-elliptic, 5-nerved, 1.4–1.6 cm long; lip white, yellowish within, with a yellow crescent-shaped spot at the base of epichil; gynochil 3.5–5 mm long, with obtuse oval-triangular lobes, concave at base, expanded 7–9 mm broad; epichil reniform, obtuse, 6.5–7 mm long, above the middle 1–1.2 mm broad, with slightly undulate margins and 3 (vary rarely 5) prominent crestlike stripes on the upper surface; column 0.8–1.1 cm long. May-June. (Plate XXXVIII, Figure 11 a).

Deciduous woods — European part: U. Dnp., Bl., Crim.; Caucasus: Cisc., W. and E. Transc., Dag. Gen. distr.: Scand., Centr. Eur., Atl. Eur., W. Med., Bal.-As. Min. Described from Europe. Type in London.

4. **C. longifolia** Huds)). Fritsch. Oesterr. Bot. Ztschr. (1888) 81; Kryl., Fl. Zap. Sib. III, 700. — Serapias Helleborine . longifolia L. Sp. Pl. ed. I (1753) 950. — S. longifolia Huds. Fl. Angl. (1762) 341, p.pt. — Epipactis alba β angustifolia Crantz. Stirp. Austr. ed. 2, fasc. VI (1769) 460. — Serapias xiphophyllym Ehrh. vel. S. grandiflora ensifolia L. f. Suppl. (1781) 404. — Cephalanthera ensifolia L.C. Rich. Mem. Mus. Par. IV (1818) 60; Ldb. IV (1858) 78; Boiss. Fl. Or. V (1884) 85. — C. xiphophyllum Rchb. Ic. Fl. Germ. XIII–XIV (1851) 135; Shmal'g., Fl. II, 451. — Ic.: Rchb. l.c. t. 118. — Exs.: Pl. Finl. exs. No. 580.

633 Perennial; rhizome horizontal, short, with cordlike roots; stem 15–45 cm long, erect or subflexuous, glabrous; leaves 6–9, linear-lanceolate, often conduplicate, acuminate, the middle ones 7–16 cm long and 0.9–2.8 cm broad; inflorescence erect, 5–10 (17) cm long, rather sparsely 3–10- (rarely more) flowered; lowest bract foliaceous, lanceolate, exceeding the flower; upper bracts very small, scalelike, 1–2 mm long;

flowers white, small, spreading, glabrous; sepals lanceolate, acuminate, 3–5-nerved, 1.2–1.6 cm long; petals obovate-oblong, obtuse, 5-nerved, 1–1.2 cm long; lip shorter than sepals; gynochil 8–9 mm broad when expanded, 3.5–4 mm long, concave at base with triangular obtuse lobes; epichil reniform-ovate, obtuse, with 5–7 prominent crestlike stripes, golden-yellow and minutely papillose at the tip, 4.5–5 mm long, 7–8 mm broad; column 7–9 mm long; ovary glabrous, ca. 1 cm long. May-June.

Deciduous woods. — European part: U. Dnp., U. V., V.-Ka., V.-Don, M. Dnp., Crim.; Caucasus: Cisc., W. and E. Transc., Dag., Tal.; Centr. Asia: Pam.-Al. (Fergana). Gen. distr.: Scand., Centr. Eur., Atl. Eur., W. Med., Bal.-As. Min., E. Med., Iran., Ind.-Him. Described from Europe. Type in London.

Note. The author records this species for Soviet Central Asia on the basis of D.I. Litvinov's collection, although it is possible that the plant collected by him is Cephalantherea acuminata Lindl. This species is considered to be synonymous with C. longifolia (C. ensifolia Rich.). This view is adopted by Hooker f. (Fl. of Brit. Ind. VI p. 125) and apparently also by M. Godfrey (Monogr. and Iconogr. Brit. Orch. (1933) p. 52–53). The author was unable to distinguish it with herbarium material, but is not convinced that it would also be undistinguishable in live condition.

5. C. caucasica Kränzlin in Fedde, Repert. Beih. LXV (1931) 67. — C. acuminata Ldb. in Fl. Ross. IV (1853) 78 (non Lindl.).

Perennial; rhizome short, horizontal or ascending; stems to 55 cm long, densely leafy; leaves 7–9, approximate, elliptic to oblong-elliptic, acuminate, to 11 cm long, 4–4.5 (5) cm broad; inflorescence erect, rather loose, to 12 cm long; bracts linear-subulate, the upper ones commonly half the length of ovary, 0.5–1 cm long; flowers erect, glabrous, 2–2.6 cm long (excluding ovary); petals oblong-lanceolate, obtusish, 2–2.5 cm long; petals obtuse, elliptic, 1.5–1.7 cm long; lip 1.2 cm long; gynochil with obtuse rounded lobes, concave, expanded 10 mm broad; epichil rounded-reniform, 6 mm long, 9–10 broad, with 3 crestlike stripes on the upper surface, densely covered at the tip with small mamillae; column together with anther 1.1 cm long. May.

Deciduous woods. — Caucasus: Tal. Described from woods near village of Suvant. Type in Leningrad.

634 Note. A species occupying an intermediate position between C. grandiflora and C. longofolia. It differs from C. longifolia in its longer bracts and the 3-crested epichil; the features distinguishing it from C. grandiflora are the large leaves and the linear-subulate bracts. It might be considered a hybrid between these two species but for the fact that C. grandiflora apparently does not occur in Talysh.

6. C. rubra (L.) L.C. Rich., Mém. Mus. Par. IV (1818) 60; Ldb. Fl. Ross. IV, 79; Boiss. Fl. Or. V (1884) 84; Shmal'g., Fl. II, 451; Kryl., Fl. Zap. Sib. III, 700. — Serapias rubra L. Syst. ed. 12, II (1767) 594. — S. longifolia Huds. Fl. Angl. (1762) 341, p. pt. — Ic.: Rchb. Ic. Fl. Germ. XIII–XIV (1851) t. 117. — Exs.: Herb. Fl. Cauc. No. 25; Fl. Cauc. exs. No. 226.

Perennial; rhizome ascending to subvertical; stems 25–60 cm long, puberulous at the top; leaves 5–8, oblong-lanceolate to lanceolate, 5–12 cm long, 1–3 cm broad; inflorescence rather loosely (2) 4–8 (12)-flowered, erect, rarely more than 12 cm long, the rachis densely pubescent; bracts linear-lanceolate to lanceolate, shorter than to equaling the ovary; flowers large, lilac-rose, with a white lip, spreading; sepals lanceolate, obtusish, minutely puberulous on the outside, 1.7–2.2 (2.5) cm long, 5-nerved, the midnerve thicker than the others; petals 1.5–1.8 (2) cm long, ovate-lanceolate; lip about as long as the sepals, white, reddish-margined; gynochil concave, the erect obtuse lobes enveloping the column; epichil ovate-lanceolate, tapering to a point, 4.5–6 mm broad above the middle, the upper surface furnished with somewhat prominent crisped yellowish stripes; column 7–9 mm long; ovary pubescent. June-July, (Plate XXXVIII, Figure 10).

Deciduous woods. — European part: Lad.-Ilm., U. Dnp., U. V., V.-Don, V.-Ka., Transv., L. Don, M. Dnp., Crim.; Caucasus: Cisc., W., E. and S. Transc., Tal; Centr. Asia: Mtn. Turkm. Gen. distr.: Scand., Centr. Eur., Atl. Eur., W. Med., Bal.-As. Min., Arm.-Kurd., Iran. Type in London.

Genus 324. **LIMODORUM*** L. C. RICH.

(Tournf., Inst. 437) L.C.Rich., in Mem. Mus. Par. IV (1818) 50.

Sepals and petals erect; sepals oblong-lanceolate; petals shorter and much narrower; lip furnished with a long slender cylindric spur, adnate at base to the column; gynochil short and relatively narrow; epichil broad,
635 oval, obtuse, with slightly undulate margins; column long; pollinia 2, oblong, borne on a round retinaculum. Saprophytic plants, with no green leaves, the stems clothed with scalelike sheaths.

1. **L. abortivum** (L.) Sw. in Nov. Acta Ups. (1799) 18; Ldb. Fl. Ross. IV, 77; Boiss. Fl. Or. V (1884) 89; Shmal'g., Fl. II, 450. — *Orchis abortiva* L., Sp. Pl. ed. 1 (1753) 943. — *Epipactis abortiva* All., Fl. Pedem. II (1785) 151. — *Centrosis abortiva* Sw. Summa Veget. Scand. (1814) 32. — *Inorchis abortiva* Beck. Fl. Nied. Oesterr. (1890) 215. — Ic.: Rchb. Ic. Fl. Germ. XIII–XIV (1851) t. 129.

Perennial; rhizome short, profusely covered with thickish roots; stems 40–80 cm long, pale greenish-violet, stout; scales numerous, subobtuse to obtuse; raceme erect, large, (10) 15–33 cm long, loosely 6–20-flowered; bracts oval-lanceolate, acuminate, violet-tinged in upper part, exceeding the ovary, (1.5) 2–4 (5) cm long; flowers large, lilac, the sepals and petals ca. 2 cm long; lip pale lilac, 1.6–1.7 cm long, 3–5 mm broad at base, the enlarged epichil 7–9 mm broad; spur to 1.5 cm long; column 1.2–1.5 cm long; ovary short-stipitate, not twisted. May-June.

Deciduous woods. — European part: Crim.; Caucasus: Cisc.; W. and E. Transc. Described from S. Europe. Type in London.

* First mentioned in error by Dodoneus for *Haemodorum*, a name applied by Theophrastus to a red-flowered parasitic plant.

Genus 325. **EPIPOGON*** S.G.GMELIN.

S.G. Gmelin, Flor. Sibir. I (1747) 12, t.2. Figure 2.

Sepals linear-lanceolate, recurved, slightly narrower than petals, petals lanceolate, free, drooping; lip erect, spurred at base, 3-lobed; spur short, thick, obtuse, erect; median lobe large, ovate, pointed at apex, entire or finely crenulate; lateral lobes small, auriclelike; column short, rather thick, short-beaked; pollinia 2, ellipsoid, nodding; ovary stipitate, clavate, glabrous. Saprophytes with a coralloid articulated strongly branched rhizome; stems brittle, pale yellow, red-striped, clothed with hyaline scales.

1. **E. aphyllum** (Schmidt) Sw., Summa Veget. Scand. (1814) 32; Turcz., Fl. baic.-dah. II, 184; Boiss. Fl. Or. V (1884) 93; Shmal'g., Fl. II, 450, Kryl., Fl. Zap. Sib. III, 705. — Orchis aphylla Schmidt in Mey. Phys. Aufs. (1791) 240. — Satyrium epipogium L. Sp. Pl. ed. 1 (1753)
636 945. — Epipogium Gmelini L.C. Rich. in Mem. Mus. Par. IV (1818) 81. — Epipogon Gmelini Ldb. Fl. Ross. IV (1653) 77. — Epipogum Epipogium Karst., Deutschl. Fl. (1883) 455. — Ic.: Gmelin Fl. Sibir. I (1747) t.II, Figure 2; Fl. Ross. Austr.-Or. III (1929) Figure 213. — Exs.: Fl. cauc. exs. No. 356.

Perennial, glabrous throughout; stems 7–32 cm long, hollow, somewhat inflated above the base and there to 1.2 cm thick; raceme initially nodding, becoming erect, loosely 2–8-flowered; bracts linear-lanceolate, obtusish, spreading, 0.5–1 cm long; flowers nodding, fragrant; sepals and petals pale yellow, sometimes striped with violet-reddish, 1-nerved, 1.2–1.4 cm long; lip equaling to slightly exceeding the sepals, whitish, with 4 or 6 longitudinal rows of purple or light violet warts; spur light violet, 6–8 mm long, 3–4 mm thick; column ca. 4 mm long. July. (Plate XXXIX, Figure 6, a,b).

Shady coniferous and mixed woods. — European part: Dv.-Pech., V.-Ka., U. Dnp., Lad -Ilm., U.V., Crim; Caucasus: Cisc., Dag., E., W. and S. Transc.; W. Siberia: Ob, Irt.; E. Siberia: Ang.-Say., Dau.; Far East: Kamch., Sakh., Uda, Ze.-Bu., Uss. Gen. distr.: Scand., Centr. Eur., Atl. Eur., W. Med. Bal.-As. Min., Jap.-Ch. Described from Siberia. Type in London.

Genus 326. **GASTRODIA**** R. BR.

R. Br., Prodr. (1810) 330.

Perianth tubular, inflated; sepals and petals united into a sac, this split on the lower side, with 5 short obtusish lobes at the margin, enclosing the lip; lip adnate only at base, otherwise free, oblong-oval, fimbriate on the margin; column long, with 2 pointed drooping lateral teeth near its apex; anther terminal; pollinia 2-lobed, with powdery pollen; rhizome tuberlike, obscurely articulate; stem leafless, clothed with short scalelike amplexicaul sheaths.

* From Greek epi, above, and pogon, beard, referring to the projecting lip that was considered by early botanists to be a beard.

** From Greek gaster, life, belly.

1. G. elata Bl., Mus. Bot Lugd. Bot. II (1856) 174. — Ic.: Blume, Orch. Arch. Ind. (1858) t. 53, Figure 1; Kom. and Alis., Opr. I, Plate 125.

Perennial; rhizome tuberlike, annular, horizontal, to 4–4.5 cm thick stems stout, 50–100 cm long, glabrous, brownish; sheaths scalelike, 1.5–2.5 cm long, obtusish; raceme 15–25 cm long, 2.5–3.5 cm broad; rather loose; bracts equaling or longer than ovary, linear, pointed or
637 obtusish, to 1.6 cm long; pedicels 2–2.5 mm long; sepals and petals 1–1.1 cm long, pale greenish-brown; lip whitish, channeled above; ovary 5–6 mm long, glabrous. July. (Plate XXXIX, Figure 7a–c).

Damp woods and riverside osier groves. — Far East: Uss. Gen. distr.: Jap.-Ch. Described from China and Japan.

Genus 327. **SPIRANTHES*** L. C. RICH.

L.C. Rich. in Mém. Mus. Par. IV (1818) 50, nomen conservandum.– Gyrostachys Pers. Syn. II (1807) 511.– Ibidium Salisb. Trans. Hort. Sc. I (1812) 291.

Flowers small, white or bright pink; sepals oblong to oblong-lanceolate, obtuse, 3-nerved; petals oblong-linear, 1-nerved, adnate at margins to median sepal, slightly leaning forward; lip spurless, subsessile or with a very short and broad claw, oblong to oblong-ovate, slightly constricted at or slightly above the middle, with 2 small marginal callosities at base, the margins crisped-undulate, the tip rounded; column short, tightly embraced by the margins of the lip; beak 2-toothed; anther straight; pollinia clavate, 2-parted, with narrow oblong retinaculum; pollen powdery; ovary glandular, subsessile, straight, while rachis of inflorescence spirally twisted; roots clustered, more or less tuberous.

1. Basal leaves dying off before flowering (with only a leaf rosette of the preceding year's shoot present at flowering time); flowers white. . . . . 1. **S. autumnalis** (Balb.) L. C. Rich.
+ Basal leaves retained at flowering time; flowers bright pink . . . . . 2.
2. Flowers small, 0.3–0.5 cm long (excluding ovary); inflorescence 0.4–0.8 cm broad; lip oblong, short-clawed, strongly constricted, rounded and dilated at apex, with small callosities on each side somewhat above base . . . . . 3. **S. sinensis** (Pers.) Ames.
+ Flowers larger, 0.5–0.7 cm long (excluding ovary); inflorescence (0.7) 0.8–1.2 (1.3) cm broad; lip subsessile, oval or oblong-oval, slightly attenuate toward apex, with 2 small callosities at the very base. . . . . 2. **S. amoena** (M.B.) Spreng.

1. **S. autumnalis** (Balb.) L. C. Rich., in Mém. Mus. Par. IV (1818) 59; Ldb. Fl. Ross. IV, 85; Boiss. Fl. Or. V (1884) 90; Shmal'g. Fl. II, 449. — Ophrys autumnalis Balb. Elench. (1801) 96. — Gyrostachys
638 autumnalis Dum. Fl. Belg. (1827) 134. — Ophrys spiralis L., Sp. Pl. ed. 1 (1753) 945, p. pt. — Ibidium spirale Salisb., in Trans. Hort. Soc. I (1812) 291. — Spiranthes spiralis C. Koch, Linnaea XXII

* From Greek speira, spiral, and anthos, flower.

(1849) 290. — Ic.: Rchb. Fl. Germ. XIII-XIV (1851) t. 122. — Exs.: Fl. Austro-Hung. No. 1024.

Perennial; stems 10–25 (35) cm long, with several appressed strongly acuminate green sheaths 1.5–4 cm long; basal leaves dying off before flowering, the leaves present at flowering time being the rosulate ovate leaves on the preceding year's shoot; tubers oblong, obtuse; inflorescence 1-sided, 5–10 cm long, with twisted glandular rachis; bracts ovate-lanceolate, 0.5–0.9 (1) cm long, to 3 mm broad, acuminate, slightly pubescent, equaling or slightly exceeding the ovary; flowers white, slightly pubescent outside; sepals obtusish, 3–4.5 (5) mm long; petals ligulate, 1-nerved; lip oblong-ovate, obtusish, somewhat dilated above the middle, slightly undulate at the margin, with 2 small obtuse auricles at base. September. (Plate XXXIX, Figure 10, a).

Meadows. — Caucasus: W. Transc. Gen. distr.: Atl. Eur., Centr. Eur., W. Med., Bal.-As. Min. Described from Condova (Italy).

2. **S. amoena** (M. B.) Spreng., Syst. III (1826) 708. — Neottia amoena M. B. Fl. Taur.-Cauc. III (1819) 606. — Gyrostachys amoena Bl., Orch. Arch. Ind. (1858) 129. — Spiranthes congesta Lindl. Bot. Reg. (1824) sub t. 823. — S. australis auct. fl. ross. et Lindl. pro max pt., non Neottia australis R. Br. — Ic.: Gmelin, Fl. Sibir. I (1747) t. 3, Figure 1. — Exs.: HFR No. 1388.

Perennial; tubers slender, cylindric, 2–2.5 mm thick; stems 15–30 (35) cm long, bearing 2–4 leaves in lower part and acuminate sheaths in upper part; leaves linear-lanceolate to lanceolate, subobtuse, (3) 4–7.5 (9) cm long and 0.4–0.7 (0.9) cm broad; inflorescence dense, (1.5) 2.5–10 (11.5) cm long, (0.7) 0.8–1.2 (1.3) cm broad, the rachis more or less glandular; bracts ovate-lanceolate, acuminate, 0.5–0.8 cm long, 2–2.5 mm broad, equaling the ovary; sepals obtusish; 5–7 mm long; lip about as long (5–6 mm) and 2.5–3 mm broad, oval to oblong-oval, whitish, with slightly undulate margins, posterior portion broader, glabrous, with 2 approximate callosities; anterior portion minutely papillose. July-August. (Plate XXXIX, Figure 8, a).

Wet meadows near rivers and lakes, and peat bogs. — European part: V.-Ka.; W. Siberia: Ob, Irt., U. Tob., Alt.; E. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Ze.-Bu., Uss., Uda, Sakh. Gen. distr.: Dzu.-Kash., Mong., Jap.-Ch. (Manchuria, Korea). Described from Siberia. Type in Leningrad.

639 3. **S. sinensis** (Pers.) Ames. Orch. II (1908) 53. — Neottia sinensis Pers. Syn. II (1807) 511. — Spiranthes australis Lindl. p. pt.

Perennial; tubers slender, cylindric; stems (16) 30–50 cm long, the lower part with 3–6 leaves, the upper part with acuminate sheaths; leaves linear to linear-lanceolate, acuminate, 4–14 cm long, 0.3–0.9 cm broad; inflorescence dense, slender, (4) 5–14 cm long, 0.4–0.8 cm broad, the rachis glandular; bracts ovate-lanceolate, acuminate, 4–5 mm long, 1–2.5 mm broad, equaling the ovary; sepals and petals obtuse, 3–4.5 mm long, 1–1.5 mm broad; petals slightly narrower and shorter than sepals; lip 3.5–4 (4.5) mm long, 2–2.25 mm broad, whitish, oblong, constricted

at the middle by rolling in of the margins, dilated at apex, as in S. amoena undulate-margined, profusely papillose on the dilated anterior portion, the 2 callosities very narrow and situated on the sides somewhat above the glabrous base. July-August. (Plate XXXIX, Figure 9, a).

Meadows. — Far East: Uss., Ze.-Bu. **Gen. distr.**: Jap.-Ch. (Japan, Korea, S. and Central China); Ind.-Him. Described from Canton (China).

Genus 328. **GOODYERA*** R.BR.

R. Br. in Ait. Hort. Kew. ed. 2, V (1813) 197, nomen conservadum. — Peramium Salisb., Trans. Hort. Soc. I (1812) 301.

Sepals oval to oblong-oval, the median united with petals into a hood; lip spurless, strongly concave in posterior part, rounded-ovate, the anterior portion forming a very short triangular recurved tip; gynostemium short; beak straight, pointed, shortly 2-parted; anther straight; pollinia 2, sessile, obovoid, attached to rather large orbicular or lanceolate gland; ovary fusiform-cylindric, subsessile, twisted at base; rhizome cordlike, branched, creeping, giving rise to shoots bearing stems or leaf clusters; flowers small or medium-sized, in a dense mostly 1-sided raceme.

1. **G. repens** (L.) R.Br. in Ait. Hort. Kew. ed. 2, V (1813) 198; Ldb. Fl. Ross. IV, 86; Turcz. Fl. baic.-dah. II, 188; Boiss. Fl. Or. V (1884) 90; Shmal'g., Fl. II, 489; Kom. Fl. mansh. I (1901) 529; Kryl., Fl. Zap. Sib. III, 712. — Satyrium repens L., Sp. Pl. ed. I (1753) 945. — Peramium repens Salisb., Trans. Hort. Soc. I (1812) 301. — Tusacca repens Rafin., Préc. Décour. (1819) 43. — Orchiodes
640 repens O. Ktze, Rev. Gen. (1891) 675. — Ic.: Rchb. Ic. Fl. Germ. XIII-XIV (1831) t. 130. — Exs.: HFR No. 588.

Perennial; stems 8-25 (35) cm long, covered above with short glandular hairs; leaves 4-8, borne on the lower part of the stem, ovate or elliptic, acuminate to subobtuse, 1.8-3.5 cm long, 1-2 cm broad, prominently reticulate due to 5 longitudinal and numerous transversal veins, rounded at base or cuneately narrowed into a short broad amplexicaul petiole; inflorescence 1-sided, (2) 4-7 (15) cm long; bracts lanceolate, acuminate, exceeding the ovary; flowers small, white or faintly yellowish-white, minutely glandular outside; sepals and petals 3-4 mm long, 0.75-2.5 mm broad; lip strongly concave, slightly shorter than sepals and petals, with a depression 1.5-1.75 mm deep, the triangular tip 1 mm long; ovary glandular. July-August. (Plate XXXIX, Figure 11 a, b).

Shady coniferous and mixed woods. — European part: Kar.-Lap.; Dv.-Pech., V.-Ka., Lad.-Ilm., U.V., U. Dnp., Crim., V.-Don; Caucasus: Cisc., Dag., E., W. and S. Transc.; W. Siberia: Ob, Irt., Alt.; E. Siberia: Ang.-Say., Yen., Lena-Kol., Dau.; Far East: Kamch., Sakh., Uda, Ze.-Bu.; Uss.; Centr. Asia: Dzu.-Tarb., T.Sh. **Gen. distr.**: Scand., Centr. Eur., Atl. Eur., W. Med., Bal.-As. Min., Afghanistan, Himalayas, North America. Described from Sweden. Type in London.

* Named for John Goodyer, a 17th-century botanist who worked in the Oxford area.

Genus 329. **ZEUXINE*** LINDL.

Lindl., Orch. Scel. (1826) 9.

Median sepal united with the petals into a hood; lateral sepals spreading; lip short than sepals, saccate at base but narrow, the anterior portion entire, slightly enlarged at apex, distinctly separated from the inflated base by a narrow constriction; column short; pollinia 2-lobed, with a very short caudicle. Small plants with densely leafy stems and slender rhizome; inflorescence a dense spikelike raceme; flowers small.

Section 1. **EUZEUXINE** Lindl. (Gen. et Sp. Orch. (1840) 485).— Leaves linear, without petioles; inflated part of lip saccate, glabrous within or furnished with small callosities.

1. **Z. strateumatica** (L.) Schlechter., Orch. Dtsch. Neu Guin. (1911) 77.— Orchis strateumatica L., Sp. Pl. ed. I (1753) 943.— Adenostylis strateumatica Ames. Orchid. II (1908) 59.— Pterigodium sulcatum Roxbg. Hort. Beng. (1814) 63.— Zeyxine sulcata Lindl., Gen. et Sp. Orch. (1840) 485.— Ic.: Fédchenko, Rast. Turk. (1915), fig. 171.

641 Perennial; rhizome slender, ascending; stems 6–16 cm long, with numerous narrow linear leaves; raceme 2.5–5 cm long, 0.9–1.8 cm broad; bracts exceeding the flower, hyaline, acuminate, 1-nerved, 0.8–1.5 cm long; flowers white; sepals and petals 3.5–5 mm long; lip enlarged reniform at apex. March-April. (Plate XXXIX, Figure 12).

Centr. Asia: Pam.-Al. **Gen. distr.**: Ind.-Him., Jap.-Ch. Described from Ceylon. Type in London.

TRIBE V. **OPHRYDEAE** LINDL.

Lindl. Orch. Scel. (1826) 12.

Stamen 1; anther adnate dorsally throughout; pollen powdery; plants glabrous, except for the sometimes more or less pubescent or papillose petals; tuberoids more or less developed.

Genus 330. **HABENARIA*** WILLD.

Willd. Sp. Pl. IV (1805) 44.

Sepals unequal, the median straight oval obtuse concave, the lateral longer asymmetric often falcate drooping; petals straight, asymmetric, broadly ovate or ovate-lanceolate, obtuse, the outer margin sometimes dentate; lip 3-lobed, the lobes variously shaped, often with fimbriate-dentate margin, spurred at base; spur long, cylindric, more or less clavately enlarged at tip; column short; anther short, the anther cells divergent at base and prolonged into short forward-turned channels; beak

* From Greek zeuxis, union, referring to union in pairs of the 4 or 8 pollinia and also the union of lip and column.

** From Latin habena, bridle.

3-lobed, its lateral lobes united with the anther channels and each terminating in a glabrous retinaculum; stigmatic surfaces borne on 2 rather long thickish processes, these mostly exceeding, rarely shorter than the anther channel; ovary short-stipitate, twisted; bracts herbaceous; tubers entire, ellipsoid, formed at the ends of underground shoots.

1. Sepals white; lip olive-green, cruciform, with linear-oblong lobes. . . . . 1. **H. linearifolia** Maxim.

\+ Sepals green; lip white, withbroad fimbriate-dentate lateral lobes, reniform in outline . . . . . 2. **H. dianthoides** Nevski.

642 1. **H. linearifolia** Maxim. Prim. Fl. Amur. (1859) 296; Kom. Fl. Mansh. I (1901) 520. — H. sagittifera Kränzl. in Fedde, Repert. Beih. LXV (1931) 63 [non Rchb. f. in Bot. Ztg. (1845) 334]. — Ic.: Regel. Tent. Fl. Ussur. t. 10, fig. 14–18.

Perennial; stems to 90 cm long and 6 mm thick; leaves narrowly linear, long-acuminate, to 15 cm long and to 7–(9) mm broad; raceme loosely many-flowered, to 15–(18) cm long; bracts long-acuminate from ovate base, 8–20 mm long, green, the lower equaling and the upper exceeding the ovary; flowers 8–12 (15), white with olive-green lip, faintly scented; median sepal broadly ovate, obtusish, 6–(7)–nerved, 7–(7.5) mm long, 6–(7) mm broad at base; lateral sepals falcately curved, asymmetric, 8–8.5 mm long and to 6 mm broad, commonly 4-nerved; petals 6–7 mm long, to 6 mm broad at base, ovate, obtuse, at base on outer margin with a triangular tooth, this slightly dissected at the tip, 2–2.5 mm long; lip thickish, pale olivaceous, 15–16 mm long, between the tips of lateral lobes to 20–22 mm broad, cruciform, the undivided part narrowly linear 1 mm broad; lobes to 2 mm broad, the lateral ones spreading at right angles, to 12 mm long, falcately curved, the tips dissected into narrowly linear teeth; median lobe oblong-linear, entire, 9–11 mm long; spur slightly curved and somewhat thickened at the end, whitish-green, 17–22 mm long. July-August. (Plate XL, Figure 1).

Wet meadows with clayey or peaty soil and overgrown lake shores. — Far East: Uss., Ze.-Bu. **Gen. distr.**: Jap.-Ch. Described from southern course of Amur, below village of Onni. Type in Leningrad.

2. **H. dianthoides** Nevski sp. nova in Addenda III, p. 751. — H. radiata f. pauciflora Kom. in "Opred. rast. Dal'nevost. kr." I (1931) 402. — H. radiata Kränzl. in Fedde, Repert. Beih. LXV (1931) 64, non Miq. Prol. Fl. Jap. (1865–67) 139.

Perennial; small plants with slender stems 13–20 cm long; tubers small, ellipsoid, formed at the ends of rather long underground shoots; leaves linear-lanceolate, acuminate, 1.5–3.5 cm long, 0.2–0.5 cm broad; flower solitary, terminal, rarely 2; bracts ovate-lanceolate, long-acuminate, 8–10 mm long, green; median sepal elliptic-ovate, obtuse, concave, 6–7 mm long, 3–3.5 mm broad, ribbed by prominent nerves; lateral sepals about as long (7 mm) and similarly green-colored; petals white, many-nerved, broadly ovate to suborbicular-ovate, 7–8 mm long and 5–7 mm broad, asymmetric, subobtuse, on the outer margin at base faintly crenulate
643 or rarely with 2–3 small inconspicuous obtuse teeth; lip reniform in outline, 12 mm long and 20–24 mm broad, divided in front by 2 clefts into 3 lobes; median lobe triangular-oblong, obtusish, 5–7 mm long, 2.5–4 mm broad

at base, entire; lateral lobes broad, crescent-shaped, the outer margin fimbriate-dentate; spur straight, cylindric, scarcely clavate at the end, 1.5–2.3 cm long. August. (Plate XL, Figure 2).

Sandy coastal meadows. — Far East: Uss. Endemic? Described from mouths of Mongugai River. Type in Leningrad.

Note. A species closely related to the Japanese H. radiata Miq., from which it differs in the following characteristics: the shape of petals (these are ovate in H. radiata); the more pointed dentate-margined lip, as opposed to the lip of H. radiata with its long and narrower median lobe and the more long-fimbriate lateral lobes with longer teeth; and, finally, the short and slender spur (on the case of H. radiata to 4 cm long and 2.5 mm thick), the low stature, and small flowers.

Genus 331. **HERMINIUM** R. BR.

R. Br. in Ait Hort. Kew. ed. 2, V (1813) 101.

Flowers somewhat nodding due to a twist of ovary; perianth campanulate; sepals ovate-lanceolate, obtuse; petals longer than sepals, subhastate, with a long narrow tip; lip 3-lobed; lateral lobes subulate-linear, obtuse; median lobe 2–2½ times as long, thickish; base of lip with saccate depression forming a kind of very short spur; column very short; anther cells parallel; pollinia small, with very short caudicles; glands large, concave, naked, not contained in pouches; stigmatic lobes 2, distinct, semicircular, slightly protruding from the cavity; ovary sessile, twisted, slightly curved at apex; bracts herbaceous; tuber solitary, globose; young tubers forming at the ends of underground shoots.

1. H. monorchis (L.) R. Br. in Ait. Hort. Kew. ed. 2, V (1813) 191; Ldb. Fl. Ross. IV, 73; Turcz. Fl. baic.-dah. II, 2, 183; Boiss. Fl. Or. V (1884) 82; Shmal'g., Fl. II, 460; Kom. Fl. Mansh. I (1901) 512; Kryl., Fl. Zap. Sib. III, 690. — Ophrys Monorchis L. Sp. Pl. ed. 1 (1753) 947. — Orchis Monorchis All. Fl. Pedem. II (1785) 148. — Dienia Gmelini Lindl. Gen. et Sp. Orch. (1830) 23. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 63. — Exs.: HFR No. 442.

Perennial; tuber 5–8 mm in diameter; stem 8–25 cm long, clothed at base with brownish sheaths; leaves 2 (3), borne at the stem base,
644 lanceolate or oblong-obovate, 4–10 cm long, 0.6–1.5 cm broad; inflorescence rather loose, to 8–10 cm long and 8 mm in diameter; bracts linear-lanceolate to linear, acuminate, shorter than or rarely equaling the ovary; flowers small, yellowish-green, honey-scented; sepals 2.5–3 mm long and 1–1.25 mm broad; petals and lip 3.25–3.75 mm long. June-July.

Damp meadows and forest glades. — European part: Lad.-Ilm., U. Dnp., V.-Don, U. V., V.-Ka., Transv., Dv.-Pech. (Vologda), L. Don; W. Siberia: U. Tob., Ob., Alt., Irt.; E. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East; Ze.-Bu., Uss.; Centr. Asia: Dzu.-Tarb. Gen. distr.: Scand., Centr. Eur., Atl. Eur., W. Med., Bal.-As. Min. (W. part), Ind.-Him., Tibet, Mong., Jap.-Ch. Described from Europe. Type in London.

Note: The plant portrayed by Gmelin (I. G. Gmelin, Fl. Sib. I, 18, tab. IV, f. 1) under the designation "Orchis radice subrotunda, labello hastato" is without any doubt Herminium monorchis (L.) R. Br.

Similarly, Schlechter commited an error in listing " Dienia Gmelini", described by Lindley from Gmelin's same illustration, among the synonyms of Microstylis monophyllos Lindl.

Genus 332. **CHAMAEORCHIS*** RICH.

L.C. Rich in Mem. Mus. Par. IV (1818) 49.

Sepals ovate-oblong, obtuse, 3-nerved, forming a hood; petals oblong, 1-nerved, shorter than sepals; lip spurless, oblong-ovate, obtuse, scarcely concave at base, entire or obscurely 3-lobed; column short; anther ellipsoid, obtuse, with subparallel locules; pollinia oblong-ovoid, the very short stalks adherent to 2 large round naked glands; ovary sessile, twisted. A small arctic or alpine plant with ellipsoid or ovoid tubers and herbaceous bracts.

1. **Ch. alpinus** (L.) L.C. Rich. in Mém. Mus. Par. IV (1818) 57. — Ophrys alpina L. Sp. Pl. ed. I (1753) 948. — Orchis alpina Scop. Fl. Carn. ed. 2, II (1772) 196. — Chamaerepes alpina Sprengl. Syst. III (1826) 702; Ldb. Fl. Ross. IV, 74. — Herminium alpinum Lindl. Bot. Reg. (1823) sub tab. 1493. — Ic.: Rchb. f. Ic. Fl. Germ. XIII-XIV (1851) t. 64. — Exs.: Fl. Austr. Hung. No. 1025.

Stem 4–8 (10) cm long, with 2 obtuse membranous whitish or brownish sheaths; leaves 6–10, crowded above the stem base, narrowly linear, acuminate, 4–10 cm long and 1–2 mm broad, equaling or slightly exceeding
645 the inflorescence; inflorescence to 3 cm long and 1.2 cm in diameter, densely 6–14-flowered; flowers slightly nodding, yellowish-green, sometimes partly brownish-violet; sepals ca. 3 mm long, the lateral asymmetric; petals narrower, about as long as sepals; lip greenish-yellow. 3.5–4 mm long, 2–2.5 mm broad, obtuse. July.

Stony slopes. — European part: Arct. Eur. (Kola Peninsula; the only available record being that of J. Fellman: "ad peninsulam Karelsgammen". Ledebour and Beketov repeat this record. It has not been possible to identify the exact location referred to on the Kola Peninsula). Gen. distr.: Scand., Centr. Eur., W. Med. (Alps). Described from Lapland. Type in London.

Genus 333. **NEOTTIANTHE**** SCHLECHTER

Schlechter in Fedde, Repert. XVI (1919) 290.

Sepals lanceolate, long-acuminate, united with petals into a rather narrow hood; lip densely and minutely papillose above, deeply 3-lobed, the smaller lateral lobes narrowly linear, the median lobe ligulate; spur below the lip turned downward and more or less curved, tapering from a relatively broad base, subspherically inflated at the end; anther oblong-ovoid, obtuse, narrowed toward base; beak 3-lobed, the central lobe slightly projecting from between the anther cells, the lateral lobes short and recurved; pollinia clavate, with short caudicles; glands subglobose, each

* Literally – dwarf Orchis.

** Derived from Neottia and anthos.

situated between a lateral lobe of the beak and the margin of anther cell; stigma concave; ovary subsessile, twisted; tubers subglobose.

1. **N. cucullata** (L.) Schlechter in Fedde, Repert. sp. nov. XVI (1919) 292. — Orchis cucullata L. Sp. pl. (1753) 939. — Gymnadenia cucullata L.C. Rich in Mém. Mus. Par. IV (1818) 57; Ldb. Fl. Ross. IV, 66; Turcz. Fl. baic.-dah. II, 2, 180; Kom., Fl. Mansh. I (1901) 523; Kryl., Fl. Zap. Sib. III, 695. — Habenaria cucullata Hoeft., Cat. Pl. Koursk. (1826) 56; Shmal'g., Fl. II, 462. — Ic.: Gmelin Fl. Sib. I, tab. III, f. 2 et 2*; Rchb. Ic. Fl. Germ. XIII–XIV (1851) t. 66. — Exs.: HFR No. 1534.

Perennial; tubers globose or subglobose; stem 10–25 (30) cm long, slender, ribbed; leaves borne near base, subopposite, the lower elliptic short-acuminate 2.5–5.5 (7.5) cm long and 1.5–3 cm broad, the upper narrowly lanceolate acuminate; sheathing scales above the leaves 1 or 2,
646 small, narrowly lanceolate, long-acuminate; raceme erect, 1-sided, 3–8 cm long, rather loosely 6–20-flowered; flowers violet-rose, inodorous; bracts linear-lanceolate, long-acuminate, 1-nerved, equaling or slightly exceeding the ovary; sepals 1-nerved, 6–8 mm long and 1.5 mm broad; petals 1 mm broad; lip drooping, 7–9 mm long, 3-lobed from the middle, the lobes linear, the median lobe slightly longer than and twice as broad as the lateral; spur ca. 5 mm long. June-August.

Pine forests, mixed and deciduous woods, shrub thickets in stony soil, and mountain meadow slopes. — European part: U. Dnp., M. Dnp., U. V., V.-Don, V.-Ka.; W. Siberia: U. Tob., Irt., Ob, Alt.; E. Siberia: Ang.-Say., Dau.; Far East: Uss., Ze.-Bu., Sakh. **Gen. distr.**: Centr. Eur., Dzu.-Kash., Mong., Jap.-Ch. Described from Siberia. Type in London.

Genus 334. **NEOLINDLEYA** KRÄNZL.

Kränzl. in Orchidac. Gen. et Sp. I (1901) 651.

Median sepal lanceolate, 3-nerved, obtuse, forming a hood with the petals; lateral sepals inequilateral, spreading sideways, lanceolate or ovate-lanceolate, also 3-nerved and obtuse; petals obliquely ovate, inequilateral, with a broad process on the outer side; lip drooping, cuneate, 3-toothed at apex, the median tooth smaller, the lateral teeth slightly curved, the base of lip united with the column and spurred; spur very short, cylindric, recurved, obtuse, 1/9 to 1/7 the length of ovary; column very short; anther with a very narrow connective, the parallel lobes contiguous and not prolonged into a channel; pollinia stalkless; glands absent; stigma forming a slightly convex scarcely 2-lobed persistent stigmatic body, prolonged at center into a short free triangular rostellum, the minutely papillose sides receiving the pollen masses, these papillose marginal pollen surfaces coalescent with the lip; ovary sessile, twisted; flowers rose-lilac; bracts herbaceous; tuber cylindric-fusiform, gradually attenuate toward apex.

1. **N. camtschatica** (Cham.) Nevski comb. nova. — Orchis camtschatica Cham. in Linnaea III (1828) 27; Ldb. Fl. Ross. IV, 63. — Gymnadenia camtschatica Miyabe et Kudo, Flora of Saghalin (1915) 441; Hulten, Fl. Kamtsch. I (1927) 262. — Platanthera decipiens

Lindl. Gen. et Sp. Orch. (1835) 290; Ldb. Fl. Ross. IV, 71; Kom. Fl. penins. Kamtsch. I (1927) 314, non Wight. — Neolindleya decipiens Kränzl., Orchidac. Gen. et Sp. I (1901) 651. — Gymnadenia Vidalii Franchet et Sav. Enum. Pl. Jap. II (1879) 29. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 65, fig. 2; Kom. l.c. tab. XII.

647 Perennial; tuber to 7 cm long, 1 cm thick at base; stems stout, fleshy, 30–60 cm long and to 1.3 cm thick, densely leafy; leaves broad and auriculate at base, rounded-elliptic or broadly elliptic, obtuse, 5–13 cm long and (4) 5–9 cm broad; spike dense, many-flowered, to 17 cm long and 3–4.5 cm in diameter; bracts narrowly lanceolate, green, equaling or exceeding the flower except for the upper ones, subobtuse; sepals 6.5–7 mm long and ca. 3 mm broad; petals 6 mm long; lip 6–7 (7.5) mm long and near apex 4–5 mm broad; spur 3–4 mm long and 0.5 mm thick. June-July. (Plate XL, Figure 3, a).

Birch woods and shrub thickets. — Far East: Kamch., Sakh. **Gen. distr.**: N. Japan (Hokkaido, Honshu). Described from Kamchatka, from the Petropavlovsk area. Cotype in Leningrad.

Genus 335. **COELOGLOSSUM*** HARTM.

Hartm. Handb. Scand. Flor. ed. 1 (1820) 329.

Median sepal ovate, connivent with the linear petals; lateral sepals slightly spreading; sepals and petals turned upward, greenish, sometimes slightly suffused with reddish or purplish-brown; lip drooping, obcuneate, 3-toothed at apex, the median tooth commonly shorter than the lateral; lip yellowish or yellowish-brown; spur very short, gibbous, obtuse; anthers obovoid, the locules slightly divergent at base; rostellum 3-angled, slightly protruding between the bases of locules; pollinia clavate, with short caudicles; glands rounded-ovate, naked; stigma concave; ovary sessile, twisted; bracts herbaceous; tubers 2-parted, with elongate-subulate tips.

1. **C. viride** (L.) Hartm. Handb. Scand. Flor. ed. I (1820) 329; Kom. Fl. penins. Kamtsch. I (1927) 312; Kryl., Fl. Zap. Sib. III, 691. — Satyrium viride L. Sp. Pl. ed. I (1753) 944. — Habenaria viridis R. Br. in Ait. Hort. Kew. ed. V (1813) 192; Shmal'g., Fl. II, 463. — Gymnadenia viridis L.C. Rich. in Mém. Mus. Par. IV (1818) 57. — Platanthera viridis Lindl. Syn. Brit. Flor. (1829) 261; Turcz. Fl. baic.-dah. II, 2, 182; Boiss. Fl. Or. V (1884) 83. — Peristylus viridis Lindl., Syn. Brit. Fl. ed. 2 (1835) 261; Ldb. Fl. Ross. IV, 72. — Peristylus islandicus Lindl. Gen. et Sp. Orch. (1835) 297. — Coeloglossum islandicum (M. Schulze) Kom. l.c. p. 313. — C. viride β. islandicum M. Schulze in Oesterr. Bot. Zeitschr. (1898) 113. — C. bracteatum Parl. Fl. Ital. III (1850) 409. — Orchis bracteata Willd. Sp. Pl. IV (1805) 34. — Coeloglosum bracteatum (Willd.) Schlechter in Fedde, Repert. sp. nov. XVI (1920) 374. — C. viride
648 var. bracteata Rchb. f., Kom. l.c. p. 312. — Ic.: Rchb. Ic. Fl. Germ. XIII–XIV (1851) t. 82. — Exs.: Fl. Austr.-Hung. No. 3085.

* From Greek coelos, hollow, and glossa, tongue.

Perennial; tubers oblong, 2-parted, with elongate-subulate tips; stem 10–35 (40) cm long, clothed at base with brownish sheaths; leaves 2–5, elliptic-ovate, elliptic-lanceolate or rarely lanceolate, 3–8 (11) cm long and to 3–5 cm broad, the upper ones smaller and acuminate; bracts linear-lanceolate to lanceolate, subobtuse, in the typical form the lowest exceeding the flower and to 2.5–3 (4) cm long, the upper shorter than the flower; in var. bracteatum (Willd.) the lowest leaves greatly exceeding the flowers, to 4–7 cm long, the upper ones also exceeding the flowers; inflorescence 2–10 (15) cm long, rather loosely 5–25-flowered; sepals ovate, obtusish, 4.5–6 (7) mm long, 2.5–3.5 (4) mm broad, the median concave, the lateral inequilateral; petals linear, 1-nerved, obtusish, about as long as petals but merely ca. 1 mm broad; lip 6–8 (9) mm long, near apex 3–3.5 (4) mm broad, flat; spur ca. 2 mm long and 1 mm thick. — June-July.

Wood margins and glades, shrub thickets, and high mountain meadows. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Ka., V.-Don, U. Dnp., M. Dnp., Crim.; Caucasus: Cisc., Dag., W., E. and S. Transc.; W. Siberia: Ob, Irt., Alt.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al.; E. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Ze.-Bu., Uss., Okh., Kamch. (the typical form as well as var. bracteatum (Willd.)), Chuk., Sakh. **Gen. distr.**: Scand., Atl. Eur., Centr. Eur., W. Med., Bal.-As. Min., Dzu.-Kash., Mong., Tibet, Jap.-Ch., Ber., N. Am. Described from Central Europe. Type in London.

Note: The author does not regard as justified the separation of the form with particularly long bracts, that occurs in Japan and North America, and in USSR in Kamchatka, into a distinct species — C. bracteatum (Willd.) Schlechter. Side by side with this form, one encounters in these regions specimens undistinguishable from typical C. viride (L.) Hartm., and there are no differences in flower structure between typical specimens of C. viridis and var. bracteatum. The genus Coeloglossum should evidently be regarded as monotypic.

Genus 336. **LEUCORCHIS*** E. MEY.

E. Mey. Preuss. Pflanzgatt. (1834) 50.

Sepals and petals forming a campanulate or subspherical hood; lateral sepals obliquely ovate, obtusish; median sepal ovate, concave, obtuse;
649 petals inequilateral, oblong-ovate, obtuse, enlarged on one side at base; lip connivent with sepals and petals, 3-lobed, the lateral lobes linear-lanceolate acuminate, the longer and broader median lobe obtusish; spur short; cylindric, thickened at apex, obtuse, one-third the length of ovary; anther ovoid, with subparallel locules; rostellum small, the central lobe protruding between the locule bases, the ear-shaped lateral lobes enclosing the glands; pollinia clavate, with short caudicles, the glands small and naked; stigma concave; ovary sessile, twisted, much longer than perianth; flowers white or yellowish-white; bracts herbaceous; tubers deeply digitate with slender cylindric divisions.

* From leucos, white, milky, and orchis.

1. L. albidus (L.) E. Mey. ex Schur. Enum. Pl. Trans. (1866) 645.— Satyrium albidum L. Sp. Pl. ed. I (1753) 944.— Orchis albida Scop., Flor. Carn. ed. 2, II (1773) 104.— Gymnadenia albida L.C. Rich., Mém. Mus. Par. IV (1818) 57; Kryl., Fl. Zap. Sib. III, 695.— Coeloglossum albidum Hartm., Hand. Scand. Flor. (1820) 329.— Peristylus albidus Lindl. Syn. Brit. Flor. (1829) 261; Ldb. Fl. Ross. IV, 73.— Blephariglottis albida Rafin. Fl. Tellur. II (1836) 38.— Bicchia albida Parl. Fl. Ital. III (1850) 397.— Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 67.

Perennial; tubers palmately divided down to base, the slender cylindric divisions thickened at the ends; stem 12–30 (40) cm long, with 2 or 3 membranous sheaths at base; leaves 3–5, oblong-lanceolate or lanceolate, acuminate, 4–8 cm long and (0.7) 1–1.5 cm broad, the lowest leaves more obtuse and broader; inflorescence densely many-flowered, cylindric, ca. 7 cm long and 1–1.3 cm in diameter; bracts ovate-lanceolate, long-acuminate, 3-nerved, the lower exceeding and the upper slightly shorter than ovary; sepals 3-nerved, ca. 3 mm long and 1.5–1.75 mm broad; petals slightly shorter; lip barely longer than sepals and 2 mm broad; spur ca. 2–(2.5) mm long. July.

Boggy meadows and peat bogs.— European part: Kar.-Lap., Dv.-Pech. (the most southerly location in the USSR in the former Sol'vychegodsk County); Arc. Sib. (Arctic Urals). Gen. distr.: Scand., Atl. Eur., Centr. Eur., W. Med., Bal.-As. Min. (NW), Greenland. Described from N. Europe. Type in London.

Genus 337. **PSEUDODIPHRYLLUM*** NEVSKI gen. nov.

Nevski in Addenda III, p.752.

Flowers greenish, very small, with perianth ca. 2 mm long; median sepal oblong or oblong-orbicular, obtuse, 1-nerved; lateral sepals
650 spreading, oblong, 1- or 2-nerved, obtuse; all sepals thin, membranous; petals oblong-obovate, obtuse, 3-nerved, thickish, slightly shorter than the median sepal; lip drooping, orbicular to rounded-ovate, obtuse, entire, 3-nerved, thickish, spurred at base; spur small, cylindric, slightly clavate at the end, half as long again as the lip and much shorter than ovary; column very short; glands naked; rostellum 3-lobed; stigma quadrate; ovary twisted, narrowed toward base, constricted and slightly curved just below the flower; bracts herbaceous; tuber cylindric-fusiform, gradually attenuate toward apex.

1. P. **Chorisianum** (Cham.) Nevski comb nova.— Habenaria Chorisiana Cham. in Linnaea III (1828) 31.— Platanthera Chorisiana Rchb. f. in Ic. Fl. Germ. XIII–XIV (1851) 162; Kränzl. in Fedde, Repert. Beih. LXV (1931) 53.— Peristylus Chorisianus Lindl. Gen. et Sp. Orch. (1835) 297; Ldb. Fl. Ross. IV (1853) 71.— Platanthera Matsudoi Makino in Tok. Bot. Mag. (1902) 56.— P. Ditmariana Kom. in Fedde, Repert. sp. nov. XIII (1914) 165.— Ic.: Kom. Fl. penins. Kamtsch. I (1927) t. XIII.

* Name referring to similarity of habit to Diphryllum Raf. (rejected prior name for Listera orchids).

Perennial; stem 7–25 cm long (in f. elatum (Finet) Nevski to 45 cm long), with 2 short obtuse brownish membranous scales; leaves 2, borne in the middle of the stem, approximate, rounded-ovate, obtuse, 2.5–5 (7.5) cm long and 1.8–4 (6.5) cm broad, the upper smaller than the lower and more ovate and pointed; bractlike leaves above these 1 or 2 (3), small, linear-lanceolate; inflorescence rather densely many-flowered, 2.5–6 (9) cm long and 0.8–1 cm in diameter; bracts green, 1-nerved, linear-lanceolate, acuminate, the lower longer and the upper shorter than flower; lateral sepals 1.8–1.9 mm long, 0.75–0.8 mm broad; petals 1.25–1.5 mm long and 0.6–0.7 mm broad; lip 1–1.25 mm long and 1 mm broad; spur 2 mm long. (June) July-August. (Plate LX, Figure 4).

Osier beds in river valleys and birch woods. — Far East: Kamch., Sakh. **Gen. distr.**: Ber., N. Japan (Hokkaido, Honshu). Described from Unalaska. Cotype in Leningrad.

Genus 338. **PERULARIA*** LINDL.

Lindl. in Bot. Reg. (1835) sub. t. 1701.

Lateral sepals spreading, ovate to oblong-ovate; median sepals and
651 petals turned upward, connivent; median sepals ovate or rounded-ovate, obtuse, 3-nerved, like the lateral obscurely crenate-undulate near apex; petals thickish, obtuse, oblong to oblong-lanceolate, 1–3-nerved; lip drooping, oblong-linear or lanceolate, obtuse, with a short lobe or a triangular tooth on both sides at base and with a prominent obtuse swelling there above; spur slender cylindric, slightly curved, longer than the lip and about as long as or just longer than ovary; column short; anther with parallel slightly separated locules; pollinia entire, with short caudicles; glands contained in pouches on both sides of rostellum base; central appendage of rostellum projecting between the locule bases; ovary twisted; flowers yellowish-green; bracts herbaceous; tubers deeply cleft into cordlike divisions.

1. Flowers small; perianth segments 4–6 mm long; leaves obovate or broadly elliptic, 2.5–8.5 cm broad . . . . . 1. **P. fuscescens** (L.) Lindl.

\+ Flowers very small; perianth segments 2.5–3 mm long; leaves oblong-lanceolate or oblong-oblanceolate, 1.5–2.5 cm broad . . . . . 2. **P. ussuriensis** (Maxim.) Schlechter.

1. **P. fuscescens** (L.) Lindl. l.c., t. 1701; Gen. et Sp. Orch. (1835) 281; Ldb. Fl. Ross. IV, 66, p.pte; Turcz. Fl. baic.-dah. II, 2, 180. — Orchis fuscescens L. Sp. Pl. ed. I (1753) 943. — Platanthera fuscescens Kränzl. Orch. Gen. et Sp. I (1901) 637; Kom. Fl. Mansh. I (1901) 517. — Ic.: Gmelin Fl. Sib. I, t. 4, fig. II; Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 74.

Perennial; stem 25–50 (75) cm long, with 2 brownish membranous obtuse sheaths at base; leaves 3, the 2 lower ones and especially the lowest larger, obovate or rounded-elliptic, narrowed toward base into an amplexicaul sheath, obtuse, 6–15 (17) cm long and 3–8.5 cm broad; third leaf short and only 3–4 cm broad, acuminate; bractlike leaves above the true leaves 1 or more often 2, small, acuminate, 2.5–5 (10) mm broad and 2–3 cm long; inflorescence cylindric, rather densely many-flowered,

* From Latin perula, pouch, referring to the bursicules.

7–20 cm long and 1.5–2.5 cm in diameter; bracts narrowly lanceolate to linear-lanceolate, acuminate, 3-nerved, the lower longer and the upper slightly shorter than flower; sepals crenate-undulate on the margin near apex; the median 4–5 mm the lateral 4.5–6 mm long; petals 1.25 mm broad, narrower than the lateral sepals; lip 4–5.5 mm long, oblong-linear, ca. 1 mm broad; lateral teeth of the lip triangular, pointed 0.5–1 mm long, spreading at a right angle, the distance between their tips up to 3 mm; spur cylindric, scarcely thickened at the end, 7–9 mm long, equaling or barely longer than the ovary. June-July. (Plate XL, Figure 6).

652 Mountain woods (chiefly pine) and shrub thickets. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau; Far East: Ze.-Bu., Uss., Sakh. Gen. distr.: Jap.-Ch. Described from Siberia: Type in Leningrad.

2. **P. ussuriensis** (Maxim.) Schlechter in Fedde, Repert. Beih. IV (1919) 99. — Platanthera ussuriensis Maxim. in Bull. Acad. Imp. Sc. St. Pétersb. XXXI (1887) 107; Mel. Biol. XII p. 551, t. 10. — Pl. tipuloides Lindl. var. ussuriensis Regel Fl. Ussur. (1861) 157. — Pl. herbiola Lindl. var. japonica Finet. in Bull. Soc. Bot. Fr. XLVIII (1900) 281. — Ic.: Regel l.c., t.X, fig. 7–9.

Perennial; stems slender, (18) 20–35 (40) cm long, with 2 leaves in lower part; leaves oblong-lanceolate, or oblong-oblanceolate, narrowed toward base into a sheath; obtuse, 5.5–13 cm long and 1.2–2 (2.5) cm broad, the lower leaf more obtuse and larger; bractlike leaves above the true leaves 2–4, very small, linear-subulate, to 2 cm long and 2–3 mm broad; inflorescence cylindric, rather dense, 4–9 cm long and 1–1.7 cm in diameter; bracts linear-lanceolate, acuminate, shorter to slightly longer than flower; median sepal rounded-ovate, obtuse, 2–2.5 mm long; lateral sepals oblong-ovate, 2.5 or ca. 3 mm long, 3-nerved; petals oblong, 1-nerved lip 3 mm long or very slightly longer, thickish, oblong-lanceolate to nearly oblong-ovate, 1 mm broad, with an obtuse triangular lobe on each side at base; spur shorter than ovary, 5–5.5 mm long, slightly curved, slender. July-August. (Plate XL, Figure 5).

Deciduous woods and shrub thickets. — Far East: Uss. Gen. distr.: Jap.-Ch. Described from the Ussuri River. Type in Leningrad.

Genus 339. **PLATANTHERA*** L. C. RICH.

L.C. Rich. in Mem. Mus. Par. IV (1818) 48.

Median sepal broadly ovate or ovate, concave, obtuse, turned upward
655 and connivent with petals into a hoodlike structure; lateral sepals spreading, inequilateral, oblong to oblong-ovate; lip drooping, entire, linear to linear-lanceolate, spurred at base; spur long, straight or more or less curved, as long as to much longer than the ovary; column short and broad; anther with broad emarginate connective and discontiguous divergent locules or with narrow connective and contiguous parallel locules; pollinia clavate, with rather long caudicles; glands naked, beside the margin of the concave stigma; rostellum broadly triangular, very short; ovary sessile, short; flowers white, greenish-white or greenish; stems with 1 or 2 obtuse leaves

* From Greek platis, broad, and anthera, anther. The name indicates that, under the name P. bifolia, Richard was referring to the plant now called P. chlorantha Cust.

Plate XL

1. Habenaria linearifolia Maxim., flower.— 2. H. dianthoides Nevski, flower.— 3. Neolindleya camtschatica (Cham.) Nevski, flower; 3a) lip with column and ovary.— 4. Pseudodiphyrllum Chorisianum (Cham.) Nevski, flower and bud.— 5. Perularia ussuriensis (Maxim.) Schlechter, flower,— 6. P. fuscescens (L.) Lindl., flower.— 7. Platanthera ophrydioides F.Schmidt, 7a) flower.— 8. P. cornubovis Nevski, flower.— 9. P. sachalinensis F.Schmidt, flower; 9a) column with anther.— 10. P. bifolia (L.) L.C.Rich, flower; 10a) column with anther.— 11. P. Freynii Kränzl., flower.— 12. P. chlorantha Cust. ex Rchb., flower and column with anther.— 13. Lysiella oligantha (Turcz.) Nevski, flower; 13a) column with anther.— 14. Gymnadenia conopsea (L.)R. Br., flower.

NOTE: In preparation of this plate use was made of some of the drawings by K.I. Maksimovich, that were attached to herbarium specimens.

at base or at the middle, and higher up with 1–5 small bractlike leaflets; bracts herbaceous; tubers oblong-ovoid or fusiform, tapering into a cordlike process.

1. Leaves 2, at the base or on the lower part of the stem, subopposite or subdistant, narrowed at base into an amplexicaul sheath or apparently petiolate; bractlike leaflets above the leaves 1–4; very rarely basal leaf solitary and narrowed into a winged petiole . . . . . 2.
+ Leaf solitary at or just below the middle of the stem, amplexicaul; bractlike leaflets above the leaves 1–3 . . . . . 6.
2. The two leaves on the lower part of the stem subdistant, 2–4 cm apart; flowers small, the perianth segments 3–5 mm long . . . . . 5. **P. sachalinensis** F. Schmid
+ The two leaves at the base of the stem approximate to subopposite (very rarely leaf solitary); flowers larger, the perianth segments 4.5–13 mm long . . . . . 3.
3. Connective narrow, the anthers contiguous, parallel; flowers powerfully scented; spur filiform, slender . . . . . 1. **P. bifolia** (L.) L.C. Rich.
+ Connective broad and hence the anthers discontiguous, divergent below; flowers often inodorous; spur more or less clavate at the end . . . . . 4.
4. Petals lanceolate or subovate-lanceolate, slightly attenuate toward apex, obtuse, (4) 5–6.5 mm long; spur slightly clavate at the end; a rather small plant with flowers like those of P. bilofila . . . . . 2. **P. extremiorientalis** Nevski.
+ Petals narrowly lanceolate or linear from asymmetric curved broad
656 base, much narrower than the lateral sepals, obtusish, 6.5–10 mm long; spur rather strongly clavate at the end; large plants . . . . . 5.
5. Spur commonly upturned, rather strongly curved and crooked; petals without asymmetric curved base, abruptly narrowed at a narrowly linear tip . . . . . 4. **P. Freynii** Kränzl.
+ Spur horizontal or obliquely descending; petals more gradually narrowed to a linear tip from asymmetric curved base . . . 3. **P. chlorantha** Cust.
6. Anther with contiguous parallel locules; solitary large leaf oblong-lanceolate or oblong, 0.5–1.8 (2) cm broad . . . . . 6. **P. tipuloides** (L.f.) Lindl.
+ Anther with a connective ca. 3 mm broad and separated divergent locules; solitary large leaf ovate-elliptic, oblong-elliptic or oblong-lanceolate, 1.3–3.5 cm broad . . . . . 7.
7. Spur scarcely curved, as long as or barely longer than the ovary, 9–10 mm long and 0.5 mm thick . . . . . 7. **P. ophrydioides** F. Schmidt.
+ Spur arched, thick, commonly half as long again to nearly twice as long as ovary, 14–18 (22) mm long and 1.5–2 mm thick . . . . . 8. **P. cornu bovis** Nevski.

1. **P. bifolia** (L.) L.C. Rich. in Mém. Mus. Par. IV (1818) 47 (quoad nomen); Ldb. Fl. Ross. IV, 69; Turcz. Fl. baic.-dah. II, 2, 181; Boiss. Fl. Or. V (1884) 82; Kryl., Fl. Zap. Sib. III, 696.—Orchis bifolia L. Sp. Pl. ed. I (1753) 939, p.pte.—Lysias bifolia Salisb. in Trans. Hort. Soc. I (1812) 288.—Habenaria bifolia R. Br. in Ait. Hort. Kew. ed. 2, V (1813) 193; Shmal'g., Fl. II, 462.—Plantathera solstitialis Bönningh in Rchb. f. Fl. Germ. Exc. (1830) 120.—Pl. minor Kränzl. in Fedde, Repert. Beih. LXV (1931) 57, non Rchb. f.—Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 77.—Exs.: HFR No. 81.

Perennial; tubers oblong-ovoid, tapering at the end into a cordlike process; stems 25–60 cm long, with brownish basal sheaths; leaves 2, approximate, oblong-obovate or elliptic, obtuse, narrowed at base into a winged petiole, 8–18 cm long (including petiole) and (1.7) 3–5.5 (7.5) cm broad (very rarely leaf solitary); small leaflets higher up the stem 1–3, lanceolate; inflorescence rather loosely 10–25-flowered, cylindric, 6–20 cm long and 2.5–3.5 cm in diameter; bracts lanceolate to narrowly lanceolate, subobtuse, commonly as long as ovary; flowers with powerful fragrance
657 resembling that of Daphne mezereum, white, the perianth segments slightly greenish-tipped; median sepal broadly ovate, obtuse, concave, 4.5–7 mm long and at base 4–5 mm broad, commonly 5-nerved, lateral sepals longer and narrower, 7–10 mm by 3 mm, inequilateral ovate-lanceolate, obtusish, commonly also 5-nerved; petals inequilateral, obtuse, 4.5–6.5 mm long and 1.8–2 mm broad, 3-nerved, one of the outer nerves with 1 or 2 small ramifications; lip linear or ligulate, obtuse, 8–12 mm long and 1.75–2.25 (2.5) mm broad; spur filiform, slender, slightly curved or straight, pointed and greenish at the end, horizontal or obliquely descending, 2.2–3 (3.3) cm long and ca. 0.75 mm thick; anther obovoid with a narrow connective and hence contiguous and parallel. June-July. (Plate XL, Figure 10, a).

Forest glades, wood margins, and thickets. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Ka., V.-Don, U. Dnp., M. Dnp., L. Don, Transv.; Caucasus: Cisc. (Overin, Akinfiev); W. Siberia: U. Tob., Ob, Irt., Alt., Yen.; E. Siberia: Ang.-Say., Dau. (W. part). **Gen. distr.**: Scand., Atl. Eur., Centr. Eur., W. Med., Bal.-As. Min. Described from Europe. Type in London.

2. **P. extremiorientalis** Nevski sp. nova in Addenda III, p. 753. — Pl. chlorantha F. Schmidt, Reis. Amurl. (1868) p. 181, non Cust. ex Rchb. f.

Perennial; tubers oblong-ovoid, to 1.2 cm thick, tapering at the end into a cordlike process; stems 25–65 cm long; leaves at base 2, as in P. bifolia, approximate, oblong-obovate or elliptic, obtuse, 5–13 cm long and (1.5) 2–6 cm broad, the bractlike leaflets higher up the stem 2–5; inflorescence many-flowered, 6–20 cm long and to 3.5 cm in diameter; flowers white, the perianth segments greenish-tipped; median sepal broadly ovate, very obtuse, 5–7-nerved, 5–6.5 cm and 4–5 mm broad; lateral sepals 8–9 mm long and 3 mm broad, inequilateral, ovate-lanceolate, obtuse; petals lanceolate to nearly ovate-lanceolate, gradually attenuate toward apex, obtuse, recurved at base, inequilateral, (4) 5–6.5 mm long, 2 mm broad, 3–5-nerved; lip oblong, ligulate, scarcely narrowed toward apex, obtuse, (6) 7–12 mm long and 2–2.5 mm broad; spur slender, cylindric, horizontal or declined, slightly clavate at the end, with slightly crooked tip, 1.5–2.5 cm long, at the swelling 1–1.5 mm thick; anther slightly emarginate at apex, the subdistant locules slightly divergent, the connective 0.5–0.75 mm broad at apex and 2 mm below between the locules. July-August.

658 Thickets and coniferous woods. — Far East: Sakh., Uda, Uss. Endemic. Described from Sakhalin, Cape Due. Type in Leningrad.

Note. Replaces in the Far East the closely related P. bifolia from which it differs in the divergent subdistant anther locules and the thicker short spur. It is readily distinguishable from P. Freynii Kränzl. by the size of flowers and particularly the shape of petals.

3. **P. chlorantha** Cust. ex Rchb. ap. Moessl. Handb. ed. 2 II (1828) 1565; Ldb. Fl. Ross. IV, 70; Kryl., Fl. Zap. Sib. III, 698. — Orchis chlorantha Cust. Neue Alp. II (1827) 401. — Habenaria chlorantha Babing. in Trans. Linn. Soc. XVII (1836) 463; Shmal'g., Fl. II, 463. — Platanthera bifolia L.C. Rich. in Mém. Mus. Par. IV (1818) 57 (quoad plantas). — Orchis montana Schmidt. Fl. boëm. (1793) 35? — P. montana Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) 123; Boiss. Fl. Or. V (1884) 83. — Orchis virescens Zollik. ap. Gaudin Fl. Helv. V (1829) 497. — Platanthera virescens C. Koch. in Linnaea XXII (1849) 288. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 78. — Exs.: A. Callier, Fl. Siles. exs. No. 481.

Perennial; tubers oblong-ovate with elongated slender subulate tips; stem 30–60 cm long, stronger than in P. bifolia; leaves 2, on the lower part of stem, obovate or elliptic, narrowed toward base into a short petiolelike portion, obtuse or round-tipped, 10–18 cm long and 2.5–7 cm broad; leaflets higher up the stem 1–3, small, lanceolate; inflorescence rather loosely many-flowered, cylindric, 7–25 cm long and 3.5–4 cm in diameter; bracts lanceolate, acuminate, the lower slightly longer than ovary; flowers greenish-white, inodorous (or almost inodorous?), slightly larger than in P. bifolia; median sepal rounded-cordate to subreniform-cordate, 5-nerved, 6.5–7.5 mm long, 7.5–8.5 mm broad above the base, obtuse; lateral sepals obliquely ovate, attenuate toward apex, obtusish, 9–12 mm long and 5 mm broad, 5-nerved; petals narrowly lanceolate, 2.5 mm broad at base, concave, inequilateral, gradually narrowed into a narrow linear limb, 1 mm broad, 1–3-nerved, equaling the median sepal; lip linear-lanceolate, slightly narrowed toward apex, obtuse, 11–14 mm long and to 3 mm broad; spur horizontal or obliquely declined, slightly crooked and recurved, 1.8–2.7 cm long, 1 mm thick, thicker and clavate at the end, half as long again to twice as long as the ovary; anther with a broad connective and strongly divergent distant locules, the dsitance between the locules to 1.5 mm at apex and to 4 mm below. May-June. (Plate XL, Figure 12).

Deciduous and mixed woods and shrub thickets (in the Crimea and in the Caucasus most frequently in beech woods). — European part: Lad.-Ilm.,
659 U.V., U. Dnp., V.-Don, Crim.; Caucasus: Cisc., Dag., W., E. and S. Transc. Gen. distr.: Scand., Atl. Eur., Centr. Eur., W. Med., Bal.-As. Min. Described from Europe.

Note. P. bifolia does not apparently occur at all in Crimea and in Transcaucasia, and only P. chlorantha Cust. grows there. A.A. Grossgeim also reports P. bifolia only for N. Caucasus. In Transcaucasia, however, a form with a narrower connective and scarcely divergent anther locules occurs side by side with P. chlorantha. In this form the distance between the locules averages about 1 mm near the apex and 2 mm at base. Its sepals and petals do not differ from those of P. chlorantha. The spur is also clavate, but more slender than in the latter species. According to the observations of S.V. Yuzepchuk, who was

first to point out the differences between this plant and typical P. chlorantha and marked it for description under the name P. Woronovii Juz., its flowers are inodorous but the anther locules do not diverge at base. We do not propose to separate this plant from P. chlorantha, but it is possible that future studies of Caucasian specimens of P. chlorantha in live condition may lead to a different decision.

Those specimens classified by E. V. Vul'f in the Flora of Crimea under the name P. bifolia that the author was able to see, should be referred to P. chlorantha Cust.

The tubers of P. chlorantha and P. bifolia, like those of Orchis species, find medicinal use under the name "salep".

4. **P. Freynii** Kränzl. in Journ. Bot. Russ. (1913) 37; in Fedde, Repert. Beih. LXV (1931) 58. — P. chlorantha var. orientalis Schlechter in Fedde, Repert. Beih. IV (1919) 109. — P. chlorantha Kom., Fl. Mansh. I (1901) 515 (non Cust.). — P. densa Freyn in Oesterr. Bot. Zeitschr. XLVI (1896) 96, non Lindl. in Wallr. Cat. No. 7046. — Ic.: Kom. and Alis., Opred. rast. Dal'nevost. kr. I (1931) t. 124.

Perennial; stems commonly thicker and firmer that in P. chlorantha; basal scales 2, obtuse, brownish, membranous; leaves 2, somewhat above the base, obtuse, obovate or elliptic-ovate, narrowed into a winged petiole-like portion, to 21 cm long and 7 cm broad; inflorescence many-flowered, to 26 cm long and 3.5–5.5 cm in diameter; bracts lanceolate, subobtuse, the lower slightly exceeding the ovary, to 2.2 cm long; flowers greenish-white, inodorous, larger than those of P. chlorantha; median sepal rounded-cordate, obtuse, (7) 8–10 mm long and commonly 8 mm broad, many-nerved; petals to 10 mm long, at the lanceolate asymmetric recurved base 2–2.25 mm broad, abruptly narrowed into a narrowly linear subobtuse limb 0.8–1 mm broad, commonly 3-nerved; lip oblong-linear ligulate, obtuse, 1.2–2 cm long and 2–3 mm broad; spur commonly upturned and more or less curved, 2.5–2.9 cm long, at the clavate end up to 2 mm thick;
660 anther with a broad connective as in P. chlorantha and divergent locules; caudicles of pollinia longer than in P. chlorantha, 2–2.5 mm long (those of P. chlorantha ca. 1.5 mm long), the glands round. June-July. (Plate XL, Figure 11).

Deciduous woods and shrub thickets. — E. Siberia: Dau. (E. part; the most westerly location: the vicinity of Nerchinsk); Far East: Ze.-Bu., Uss. **Gen. distr.**: Jap.-Ch. Described from Kirpichnaya near Nerchinsk. Type in Prague,

Note. Replaces P. chlorantha in the Far East. Freyn, and later Kränzlin, for some reason believed this species to be a hybrid of P. chlorantha and P. obtusa and recorded it for the Far East together with P. chlorantha, but a perusal of their descriptions readily discloses that they were dealing with a representative of the eastern race of P. chlorantha and that their assumption concerning its hybrid origin was completely unfounded.

5. **P. sachalinensis** F. Schmidt, Reise Amurl. (1868) 181 in Mém. Ac. Sc. St. Pétersb. Ser. 7, XII, pt. 2.

Perennial; tubers oblong-ovoid, to 8 mm thick, attenuate-cordlike at the end; stem 35–50 cm long and to 5 mm thick; leaves 2 on the lower part of the stem, distant, obovate to oblong-obovate, very obtuse, narrowed at base into a sheath, 8–12 cm long and 2.7–5 cm broad, the upper somewhat shorter and narrower than the lower; leaflets higher up the stem 2–4, small, lanceolate; inflorescence densely many-flowered, oblong, 8–13.5 cm long 2–2.5 cm in diameter; bracts lanceolate, obtusish, the lower equaling or exceeding and the upper shorter than the flower; flowers whitish-greenish, numerous, small, fragrant; median sepal ovate, obtuse, 3–4 mm long, 3-nerved; lateral sepals inequilateral, ovate-lanceolate, obtuse, 3-nerved, ca. 5 mm long; petals connivent with median sepal, oblong-ovate, inequilateral, obtuse, abruptly narrowed at apex, 3 mm long; lip linear, obtuse, 5–6 mm long and ca. 1 mm broad; spur filiform, acuminate, greenish, 1.4–1.9 cm long and 0.5 mm thick, nearly straight or slightly curved, commonly horizontal, about twice the length of ovary; anther locules slightly divergent, approximate and contiguous or nearly contiguous at apex. July-August. (Plate XL, Figure 9, a).

Far East: Sakh. **Gen. distr.**: Japan (Hokkaido, Honshu). Described from Sakhalin. Type in Leningrad.;

6. **P. tipuloides** (L.f.) Lindl., Gen. et Sp. Orch. (1835) 285; Ldb. Fl. Ross. IV, 69; Kom. Fl. penins. Kamtsch. I (1927) 316. — Orchis tipuloides L. fil. Suppl. (1781) 401. — Tipularia kamtschatica Spreng. Syst. veget. vol. III, p. 734. — Habenaria behringiana Ames.
661 Stud. Fam. Orchid. IV (1910) t. 60. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 76, fig. I, 1–2.

Perennial; tubers fusiform, attenuate—cordlike at the end; stem slender, 20–40 (50) cm long, with 2 membranous brownish obtuse sheaths at base; leaf solitary near the middle, oblong-lanceolate, oblong to rarely oval-lanceolate, obtuse, 3.5–12 cm long and 0.5–1.8 (2) cm broad, amplexicaul at base; bractlike leaflets higher up the stem 1 or 2 (3), linear-lanceolate to lanceolate; inflorescence oblong, (3) 4–12 cm long, rather loose to fairly dense; bracts narrowly lanceolate or linear-lanceolate, subobtuse, commonly exceeding or equaling or the upper somewhat shorter than the flower; flowers greenish or yellowish-greenish, sometimes with brownish petals; median sepal 3.5–3.75 mm long and ca. 2.5 mm broad, ovate, obtuse, 3-nerved; lateral sepals also 3-nerved and obtuse, oblong-ovate, 4–5 mm long and ca. 2 mm broad, slightly inequilateral; petals 3.5–4 mm long, inequilateral, lanceolate, gradually attenuate, obtuse, connivent with median sepal; lip lanceolate, ligulate, 4–5.5 mm long and ca. 2.5 mm broad, obtuse; spur slenderly cylindric to subfiliform, 1–1.5 (1.8) cm long and 0.5 mm thick, slightly curved and pointing sideways, obtuse, longer than the ovary; anther locules approximate and parallel. July-August.

Peat bogs, boggy meadows, and swampy shores. — E. Siberia; Lena-Kol., Far East: Kamch., Sakh., Uda, Uss., Ze.-Bu. **Gen. distr.**: Jap.-Ch. (N. Japan: Hokkaido, Honshu). Described from Kamchatka.

7. **P. ophrydioides** F. Schmidt. in Reise Amurl. (1868) 182 in Mém. Acad. Pétersb., sér. 7, XII, pt. 2. — P. Reinii Franch. et Sav., Enum. Pl. Jap. II (1879) 513. — Ic.: Miyoshi et Makino, Pocket Atlas Alp. Pl. Jap. II (1907) t. 70, fig. 406.

Perennial; tubers to 6 mm thick, oblong-ovoid, attenuate-cordlike at the end; stem 15–35 cm long, with 2 membranous whitish-brown basal sheaths; leaf solitary at the middle of the stem, large, amplexicaul, broadly elliptic or oval-elliptic, very thin, obtuse or subobtuse, 3.5–7 cm long and 1.6–3.2 cm broad; bractlike leaf higher up the stem 1 or rarely 2, lanceolate, 1.5–3 cm long and 3–10 mm broad; inflorescence loosely few-flowered, 4–10 cm long; bracts lanceolate, subobtuse, 7.5–20 mm long and 1.5–4 mm broad, the lower equaling or exceeding and the upper shorter than the flower; flowers 3–10, greenish; median sepal broadly ovate, acuminate, 5–7 mm long and at base 4–5 mm broad, 3-nerved; lateral
662 sepals narrowly lanceolate to linear-lanceolate, subobtuse, 7–8 mm long and 1.5–2 mm broad, 1-nerved; petals 6–8 mm long, at base to 3 mm broad, abruptly narrowed from an asymmetric ovate base to a subulate-linear point 0.25–0.3 mm broad; lip narrowly linear, 8–10 mm long and 1–1.5 mm broad, slightly narrowed toward apex, slightly pointed, as long as or barely longer than the ovary; anther with a very broad connective and widely separated locules. July. (Plate XL, Figure 7, a).

Woods. — Far East: Sakh. Gen. distr.: Japan (Honshu). Described from Sakhalin. Type in Leningrad.

8. **P. cornu bovis** Nevski sp. nova in Addenda III, p. 752. — P. mandarinorum Kom. Fl. Mansh. I (1901) 516; Kränzl. Orchid. Sib. Enum. in Fedde, Repert. Beih. LXV (1931) 57, non Rchb. f. in Linnaea XXV (1852) 226.

Perennial; tubers oblong-ovoid, to 7 mm thick at base, long-attenuate and cordlike at the end; stem 20–50 cm long; leaf solitary at or just below the middle of the stem, oblong-lanceolate to oblong-elliptic, obtuse, 4.5–9 cm long and 1.3–3.5 cm broad; small leaves higher up the stem 1–3, lanceolate, acuminate; inflorescence loosely few-flowered, oblong, 5–12 (16) cm long and ca. 3 cm in diameter; bracts ovate-lanceolate to lanceolate, the lower ca. 2 cm long about equaling, the upper shorter than the flower; flowers greenish; median sepal broadly ovate, scarcely attenuate at apex, obtuse, 5–6 mm long and 4–6 mm broad; lateral sepals oblong, 6–7 mm long and 1.5–2.5 mm broad, obtuse, narrowed and apparently constricted at the asymmetric base; petals 6–6.5 mm long, connivent with median sepal, ovate and asymmetric at base, 3 mm broad, abruptly narrowed to an oblong-linear obtuse tip 0.5–0.75 mm broad; lip linear, 8–9 mm long, ca. 1.75 mm broad at base, 1 mm at the middle, obtuse; spur arched, stout, cylindric or cylindric-subconical, pointed at the end, commonly half as long again to twice as long as the ovary; anther with a very broad emarginate connective and widely separated locules, the distance between the locules near apex ca. 3 mm. (June)-July. (Plate XL, Figure 8).

Wood and thickets. — Far East: Uss. Gen. distr.: Manchuria, N. Korea. Described from Iodzikhe River valley (Ussuri area). Type in Leningrad.

Note. Most closely related to Platanthera Maximovicziana Schlechter (= P. minor Maxim., non Rchb. f.), from which it differs in the less divergent anther locules, the shape of lip which in P. Maximo-
vicziana is linear-lanceolate from a rhomboid base ca. 3 mm broad and,
663 finally, in the more strongly curved spur and the longer and looser

663 inflorescence. P. Maximovicziana is reported by Schlechter (in Fedde, Repert. Beih. IV (1919) 114) for Honshu and Korea, but it is apparently replaced on the continent by our species. Our plant cannot be identified with P. mandarinorum Rchb. f., since the sepals, as pointed out by Reichenbach, differ in shape, and the petals are described as being lanceolate and obtuse, while nothing is said about the spur. K.I. Maksimovich and R. Schlechter considered as P. mandarinorum Rchb. f. a Japanese plant with a straight spur 2.5–3 mm long, differing markedly from USSR species. The author has not been able to ascertain whether it conforms to the original P. mandarinorum described by Reichenbach from Fortune's Chinese collections.

Genus 340. **LYSIELLA** * RYDB.

Rydb. in Mem. N.J. Bot. Gard. I (1900) 104.

Median sepal rounded-oval to suborbicular; lateral sepals spreading sideways, oblong, inequilateral; petals connivent with median sepal, asymmetric, lanceolate or narrowed from an ovate base to a narrowly linear point; lip drooping, rhomboid-lanceolate or linear, obtusish, with 2 obtuse tubercles at the base above; spur cylindric, turned downward, scarcely pointed and slightly curved, about as long as or slightly shorter than the lip; anther emarginate at apex, with divergent discontiguous locules; pollinia with short caudicels; glands naked; rostellum very broad and short; ovary sessile, slightly twisted; flowers few, white, the tips of sepals greenish; stem with a solitary leaf at base and sometimes a bractlike leaflet higher up; bracts herbaceous; roots cordlike.

1. L. oligantha (Turcz.) Nevski comb. nova. — Platanthera oligantha Turcz. in Fl. baic.-dah. II, 2 (1856) 182. — Habenaria chlorantha Turcz. Cat. Baic. Dah. No. 1098, postea H. viridiflora nominata. — Platanthera parvula Schlechter in Fedde, Repert. sp. nov. XV (1918) 301; Hulten Fl. Kamtsch. I (1927) 265. — P. obtusata Rchb, f. Ic. Germ. XIII–XIV (1851) 119, pro parte. — Ic.: Schlechter Monogr. u. Iconogr. Orch. Eur. t. 31, fig. 121. —

Perennial; roots 3–5, cordlike; stem 7–20 cm long, with a membranous obtuse sheath and a solitary leaf at base; leaf oblong-lanceolate, obtuse, 5–7 cm long and 1.2–2.1 cm broad, strongly narrowed at base into a narrow winged amplexicaul portion; inflorescence 4–6 (9)-flowered, 2.5–4.5 cm
664 long; bracts lanceolate to ovate-lanceolate, acuminate, about as long as ovary; median sepal orbicular, 2–2.25 mm long and as broad, very obtuse, concave, 1-nerved or with 2 obscure nervules on each side of the conspicuous midnerve; lateral sepals oblong-ovate, 2.5–3 mm long and ca. 1.5–1.8 mm broad; petals inequilateral, lanceolate, obtuse, 1-nerved, 2 mm long; lip rhomboid-lanceolate, gradually attenuate, obtusish, 3–3.25 mm long and at base 1 mm broad; spur 2.5–3 mm long, half as long as the ovary. (June)-July. (Plate XL, Figure 13, a).

Deciduous and coniferous woods. — E. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Okh., Kamch. Gen. distr.: Scand. Described from Nukhu-Daban pass. Type in Kharkov; cotype in Leningrad.

* Diminutive form of Lysias (Lysias Salisb. (nomen nudum), a synonym of Platanthera Rich.).

Note. The features distinguishing this species from the American L. obtusata (Pursh.) Rydb. are apparent at first sight. In L. obtusata the flowers are twice as large; the median sepal is ca. 4 mm long, distinctly 3-nerved; the petals are broadly ovate at base, attenuate to a narrowly linear tip; the lip is 5–5.5 mm long and not more than 0.5 mm broad, the spur barely shorter than the lip.

Genus 341. **LIMNORCHIS*** RYDB.

Rydb. in Mem. IV. J. Bot. Jard. I (1900) 104.

Median sepal ovate or rounded-ovate, obtuse, (3)–5–(7)-nerved; lateral sepals spreading sideways, linear-lanceolate oblong-lanceolate or ovate-lanceolate, inequilateral, commonly 3-nerved; petals lanceolate, asymmetrically enlarged at base, subobtuse, forming a hood together with the median sepal; lip drooping, entire, linear or linear-lanceolate or lanceolate, commonly slightly dilated at base, rarely oblong-obovate and narrowed toward base, obtuse; spur slenderly cylindric, obtusish, slightly curved, shorter to rarely longer than the ovary; anther with approximate parallel locules, rarely with a fairly broad connective and slightly separated but parallel locules; glands naked; ovary sessile, twisted; flowers greenish, whitish-greenish, or white; stem densely leafy; leaves progressively decreasing in size up the stem, more or less long-acuminate; bracts herbaceous; tubers fusiform or biparted with long cordlike divisions.

1. Spur filiform, 1.5–2 cm long, much longer than ovary; lip ligulate (oblong-obovate). . . . . 3. **L. hologlottis** (Maxim.) Nevski
+ Spur cylindric, 0.5–0.8 cm long, shorter than ovary; lip linear or lanceolate, slightly attenuate toward the end . . . . . 2.

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2. Lip slightly rhomboidally dilated at base, lanceolate; flowers white. . . . . 2. **L. dilatatus** (Pursh.) Rydb.
+ Lip scarcely dilated at base, linear-lanceolate or linear; flowers greenish . . . . . 1. **L. convallariaefolius** (Fisch. ex Lindl.) Rydb.

1. **L. convallariaefolius** (Fisch. ex Lindl.) Rydb. in Bull. Torr. Bot. Club. XXVIII (1901) 628. — Orchis convallariaefolia Fisch. ex Lindl. Gen. et Sp. Orch. (1835) 287. — Platanthera convallariaefolia Lindl. l.c. p. 287; Ldb Fl. Ross. IV, 70. — P. hyperborea β var. convallariaefolia Kränzl. Orchid. Gen. et Sp. (1901) 640. — P. hyperborea Kom. Fl. Penins. Kamtsch. I (1927) 264, non Lindl. l.c. p. 287. — Ic.: Rydb. l.c. fig. 20.

Perennial; tubers fusiform; stem 25–60 cm long, densely leafy; leaves commonly 5–7, lanceolate to oblong-lanceolate, gradually acuminate, slightly narrowed toward base, (4) 5–10 cm long, 1–2.5 cm broad, spike densely many-flowered, 7–20 cm long, 1.5–1.7 cm in diameter; bracts linear-lanceolate, subobtuse, the lower longer and the upper shorter than flowers; flowers with the scent of Platanthera bifolia, greenish; median sepal broadly ovate, 3.5–4.5 mm long, obtuse; lateral sepals lanceolate, 5 mm long; lip 5–6 mm long, at base 1.5 (1.6) mm broad,

* Literally lake Orchis.

obtuse, linear to linear-lanceolate; spur cylindric, obtuse, slightly curved, commonly the length of the lip, 5–5.5 mm long. June-July.

Wet forest glades, meadows on slopes near springs. — Far East: Kamch. Gen. distr.: Ber. Described from Kamchatka. Type in Leningrad.

Note. L. hyperboreus (L.) Rydb., that occurs only in Spain and in the eastern part of North America, differs from this species in the shape of labellum which is lanceolate and rather strongly dilated at base, and the lateral sepals which are very asymmetric at base; Fischer's authentic herbarium specimen comprises, in addition to L. convallariaefolius, also two nonflowering stem fragments of Neolindleya camtschatica (= Platanthera decipiens), and this probably accounts for the not very appropriate epithet "convallariaefolius" chosen by Fischer.

2. L. dilatatus (Pursh) Rydb. in Bull. Torr. Bot. Club. XXVIII (1901) 622; Britton. Man. Fl. N. Stat. (1901) 294. — Orchis dilatata Pursh., Fl. Am. Sept. (1814) 588. — Habenaria dilatata Hook., Exot. Fl. (1825) pl. 95. — Platanthera dilatata Lindl. ex Beck., Bot. north. and middl. St. (1833) 347; Hulten, Fl. Kamtsch. I (1927) 262. — P. hyperborea γ var. dilatata Kränzl., Orch. Gen. et Sp. (1901) 640. — Ic.: Rydb. l.c. fig. 12; Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 81, fig. 1.

666 Perennial; stem 30–60 cm long; leaves lanceolate to oblong-lanceolate, 7–20 cm long and 1–2.5 cm broad, acuminate or subobtuse; spike densely many-flowered, 4–20 cm long; flowers white; median sepal obovate, 4.5–5 mm long and 4 mm broad, obtuse; lateral sepals 7 mm long and 3–4 mm broad, ovate, inequilateral, obtuse, 5-nerved; lip lanceolate, rhomboidally dilated at base and there 2–3 mm broad, attenuate to a tip not more than 1 mm broad, obtuse, 7–8 mm long; spur cylindrical, curved, 7 mm long and ca. 1 mm thick. July.

Wet meadows. — Far East: only on Komandorskie Islands (Bering Island). Gen. distr.: Ber., N. Am. Described from Labrador. Type in Dickson's herbarium.

Note. The USSR plant is distinguishable from the North American species by the more obtuse median sepal and the stouter spur; it represents apparently a distinct geographical race.

3. L. hologlottis (Maxim.) Nevski comb. nova. — Platanthera hologlottis Maxim. Prim. Fl. Amur. (1859) 268; Kom. Fl. Mansh. I (1901) 519. — Habenaria neuropetala Miq. Prol. (1867) 139. — Platanthera neuropetala Fr. et Sav., Enum. Pl. Jap. II (1879) 33. — Ic.: Somoku-Dzusetsu. Ed. Makino (Iconogr. Pl. Nippon.) XVIII (1912) t. 55.

Perennial; tubers 2-parted, the spreading elongate-fusiform divisions to 12 cm long and 1 cm thick at base; stem to 70–90 cm long and to 1 cm thick, densely leafy; leaves linear, glaucescent, slenderly long-acuminate, slightly narrowed at base into a short amplexicaul sheath, gradually attenuate toward apex, to 15–(20) cm long and 0.5–2 cm broad; spike densely many-flowered, oblong-cylindric, 6–19 cm long and 2–3 cm in diameter; bracts linear, acuminate, narrow, equaling or slightly longer than flowers; flowers pure white; median sepal elliptic to broadly elliptic, 5–7 mm long, very obtuse; lateral sepals 7–8 mm long and 3.5–4 mm broad, asymmetrically elliptic-ovate, obtuse, 5–7-nerved; petals obliquely ovate, inequilateral, 5–6 mm long and 3.5 mm broad, also obtuse, 5–7-nerved; lip oblong-obovate, thickish, obscurely crenulate at apex,

very obtuse, 8–9.5 mm long and near apex 2.5–3 mm broad; spur curved, 1.5–2 cm long, much longer than the ovary. July.

Water and mountain meadows. — E. Siberia: Dau.; Far East: Ze.-Bu., Uss. **Gen. distr.**: Jap.-Ch. (Manchuria, Japan). Described from the southern reaches of the Amur. Type in Leningrad.

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Genus 342. **GYMNADENIA*** R. BR.

R. Br. in Ait. Hort. Kew. ed. 2, V (1813) 191.

Lateral sepals spreading, oblong or elliptic, inequilateral; petals together with the ovate median sepal forming a hood; lip rhomboid, more or less distinctly 3-lobed, spurred at base; spur filiform or cylindric, as long as or longer than ovary; anther obovoid, with parallel locules; pollinia clavate, with short or fairly long caudicles; glands oblong or ovate, white, not contained in pouches, adherent at the base of rostellum to its laminar lateral lobes; central lobe of rostellum forming a mitriform process between the bases of anther locules; stigma concave; ovary sessile, twisted; flowers light purple or lilac-purple; bracts herbaceous; tubers palmately lobed; leaves linear-lanceolate or linear.

1. Spur as long as or slightly shorter than ovary, cylindric, obtuse; glands oblong-elliptic . . . . . 1. **G. odoratissima** (L.) L.C. Rich.

\+ Spur longer than ovary, filiform, pointed; glands linear-oblong. . . . . 2. **G. conopsea** (L.) R. Br.

1. **G. odoratissima** (L.) L.C. Rich. in Mém. Mus. Par. IV (1818) 57; Ldb. Fl. Ross. IV (1853) 65. — Orchis odoratissima L. Syst. 10 (1759) 1243. — Habenaria odoratissima Franch. Fl. Cher. et Loire (1885) 578; Shmal'g., Fl. II, 462. — Satyrium odoratissimum Wahlenb. Fl. Suec. (1826) 557. — Ic.: Rchb. Ic. Fl. Germ. XIII–XIV (1851) t. 69. — Exs.: HFR No. 2665.

Perennial; stem slender, 15–30 (45) cm long, leafed at base; leaves linear or narrowly linear, acute, to 20 cm long and to 0.5 (1) cm broad; though mostly narrower and shorter; spike more slender than that of G. conopsea, densely many-flowered, to 9–(15) cm long and to 1–1.2 cm in diameter; bracts lanceolate, acuminate, commonly about equaling the ovary; ovary 4.5–5 mm long; flowers smaller than in G. conopsea, lightly purple or pale lilac-purple, vanilla-scented; sepals oblong to oblong-ovate, obtuse, 2.5–3 mm long; median sepal concave; petals broadly ovate, very asymmetric, with a round appendage on the outside; lip 2.3–3 mm long and as broad, rhomboid-ovate, shortly 3-lobed, the lateral lobes very
668 short and obtuse, the median lobe much longer ovate and also obtuse; spur directed downward, 4 mm long. June.

Meadows. — European part: U. Dnp., M. Dnp. **Gen. distr.**: Scand.; Centr. Eur., Atl. Eur., W. Med., Bal.-As. Min. (W. part). Described from Europe. Type in London.

2. **G. conopsea** (L.) R. Br. in Ait. Hort. Kew. ed. 2 V (1813) 191; Ldb. Fl. Ross. IV, 64; Turcz. Fl. baic.-dah. II, 179; Boiss. Fl. Or. V (1884) 81; Kom. Fl. Mansh. I (1901) 514; Kryl., Fl. Zap. Sib. III, 693. — Orchis

* From Greek gymnos, naked, and aden, gland, alluding to the naked glands of the pollinaria.

conopsea L. Sp. Pl. ed. I (1753) 942. — Satyrium conopseum Wahlenb. Fl. Suec. (1826) 557. — Habenaria conopsea Benth. in Journ. Linn. Soc. XVIII (1880) 354; Shmal'g., Fl. II, 461. — Orchis conopea A. Gras in Bull. Soc. Bot. Fr. IX (1862) 334. — Gymnadenia conopea Gren. Fl. Chaine Jura (1865) 781. — G. sibirica Turcz. ex Lindl. Gen. et Sp. Orch. (1835) 277. — G. comigera C. Koch in Linnaea XXII (1849) 286. — Orchis densiflora Wahlenb. in Acta Holm. (1806) 68. — Gymnadenia densiflora Dietr. in Allgem. Gartenztg. VIII (1839) 70. — G. conopsea var. densiflora Lindl. l.c. p. 276. — G. conopsea var. ussuriensis Rgl. in Tent. Fl. Ussur. (1861) 474. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 70–73. — Exs.; HFR No. 2666; Pl. Finl. exs. No. 579 (f. lapponica Zetterstedt).

Perennial; stem 25–65 cm long, clothed at base with brownish sheaths; leaves 4–7, linear-lanceolate, acuminate, more or less mitriform at apex, slightly conduplicate and thus carinate beneath, 7–20 (25) cm long and 0.5–2 (2.5) cm broad, the upper ones smaller; tubers palmately 4–6-lobed, laterally compressed; spike densely many-flowered, cylindric, 6–15 cm long and to 2 cm in diameter; bracts elliptic-lanceolate, long-acuminate, the lower mostly slightly exceeding or equaling, the upper shorter than the flower; flowers lilac-rose or pale lilac-purple, faintly clove-scented; sepals oblong-ovate, obtuse, 3-nerved, 2–3 mm broad; median sepal concave, 4–4.5 mm long; lateral sepals ca. 5 mm long; petals broadly ovate, obtuse, 3-nerved, inequilateral; lip 5 mm long and 5 mm broad, rhomboid, 3-lobed, the lobes subovate obtuse, the median slightly longer than the lateral; spur commonly arched, 1.3–1.8 cm long and half as long again to twice as long as the ovary; ovary strongly twisted, ca. 8 mm long. June-July. (Plate XL, Figure 14).

Meadows, glades, and thickets. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V. Dnp., M. Dnp., Bl., Crim., Alt., Yen.; E. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Okh., Sakh., Uss., Ze.-Bu.,
669 Uda; Caucasus: Cisc., W., E. and S. Transc., Dag. **Gen. distr.**: Scand., Centr. Eur., W. Med., Bal.-As. Min., Iran., Dzu.-Kash., Mong., Jap.-Ch. Described from Europe. Type in London.

Genus 343. **GALEORCHIS*** RYDB.

Rydb. in Britton, Man. (1901) 292.

Flowers 1–3–(5), with elliptic or lanceolate foliaceous bracts; sepals lanceolate, obtusish or attenuate subobtuse, 3-nerved, forming a broad hood; petals narrower, oblong, 1-nerved; lip rounded-obovate or more narrow, entire or distinctly lobed, slightly crenulate, flat, spurred at base; spur cylindric, slightly pointed, declined or horizontal; column straight; pollinia oblong-ovoid, with long caudicles; glands round, enclosed in 2 small pouches; ovary sessile, slightly twisted. Small plants with creeping rhizome; leaves 1 or 2, obovate or rounded-obovate, narrowed into a winged petiolelike portion; bracts herbaceous.

* From Greek galea, hood, and Orchis.

1. G. **cyclochilus** (Franch. et Sav.) Nevski comb. nova. — Habenaria cyclocheila Franch. et Sav. Enum. Pl. Jap. II (1879) 516. — Orchis cyclochila Maxim. Bull. Ac. Sc. St. Pétersb. XXXI (1887) 104; Kom. Fl. Mansh. 1 (1901) 511. — Gymnadenia cyclochila Korsh. in. A.H.P. XII (1892) 396. — Orchis Palczewskii Kränzl. in Journ. Russ. Bot. (1913) p. 26 et in Fedde Repert. Beih. LXV (1931) 45. — Ic.: M. Miyoshi et T. Makoni, Pock. Atl. Alp. Pl. Jap. I (1907) t. VII, fig. 41. — Exs.: HFR No. 1937.

Perennial; stem 10–20 cm long, with 1 or 2 membranous brownish-white obtuse sheaths; leaf solitary, rounded-obovate or obovate, strongly narrowed at base, obtuse, 5.5–8 cm long and 3–6 cm broad; bracts 1.2–3 cm long and 0.5–1.2 cm broad, green, elliptic or lanceolate; flowers slightly nodding, pale pink; lip speckled with darker reddish-pink; sepals 7–9 mm long and 3.5 mm broad; petals narrower, not more than 1 mm broad; lip 1–1.1 cm long, 0.6–0.75 cm broad, conspicuously crenate, narrowed toward base; spur to 8 mm long. June. (Plate XLII, Figure 11).

Damp mixed and coniferous woods. — Far East: Uss. Gen. distr.: Jap.-Ch. Described from Japan. Type in Paris.

Note. Franchet and Savatier noted in the description of their Habenaria cyclochila that the glands in that species are naked ("glandulae nudae"). Kränzlin (Orch. Sib. Enum. p. 44) apparently placed
670 full reliance on their description in recording the same character. An analysis of the flower discloses, however, that the glands are enclosed in two small pouches. In the kindred American species G. spectabilis, the two glands, which are round and slightly concave beneath, are also enclosed in two separate bursicules. K.I. Maksimovich, in his analysis of the flower of Habenaria cyclochila, was apparently misled by Franchet's description and doubted the presence of bursicules. They are not shown in his drawing, but there is a marginal annotation "bursiculae" with a question mark. Beside the species indicated, the genus also contains G. Roborovskyi (Maxim.) Nevski and G. Reichenbachii Nevskii nom. n (= Orchis spathulatus Rchb. f. ex. Benth. in Journ. Linn. Soc. XVIII (1881) 355, non L. f. Suppl. 396).

Genus 344. **CHUSUA*** NEVSKI gen. nov.

Nevski in Addenda III, p. 753.

Flowers few, in a 1-sided inflorescence; bracts herbaceous; sepals ovate-lanceolate, subobtusely attenuate; lateral sepals long, spreading sideways; median sepal forming a hood together with the petals or else distinct and slightly turned upward; lip with a cylindric spur, rhomboid or rounded-rhomboid, 3-lobed or entire, cuneately narrowed toward base; anther obovate, with parallel locules; pollinia clavate, with rather short caudicles; glands contained in 2 small distinct hemispherical pouches; ovary sessile, twisted; tubers small, undivided, globose or ovoid, the size of peas.

1. **Ch. secunda** Nevski nom. nov. — Orchis pauciflora Fisch. ex Lindl. Gen. et Sp. Orch. (1835) 280; Turcz. Fl. baic.-dah. II, 2, 176;

* A local Indian name for Orchis Chusua (Don) (choo-swa).

Kom. Fl. Mansh. I (1901) 510, non Tenore, Prodr. (1811) p. LII. — Gymnadenia pauciflora Lindl. Gen. et Sp. Orch. (1835) 280; Ldb. Fl. Ross. IV, 66. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 170, fig. 1.

Perennial; tubers 0.5–1 cm long; stem 14–30 cm long, slender, with 2 membranous brownish sheaths at base; leaves (1) 2, oblong-lanceolate, subobtuse or acuminate, sessile, 3–8.5 cm long and 0.4–1.8 cm broad; inflorescence 1-sided, 2–8 (11)-flowered; flowers lilac-purple, with violet-speckled lip; bracts foliaceous, lanceolate, 1–4.5 cm long and 2–7.5 mm broad, acuminate, the lower commonly equaling and the upper shorter than the flower; lateral sepals spreading, inequilateral, acuminate, 7–10 mm long and to 4.5 mm broad, ovate to ovate-lanceolate median sepal elliptic-ovate, acuminate, 7–9 mm long, 3.5 mm broad, slightly raised above the
671 petals; petals forming a hood, ovate, obtuse, inequilateral, 5–8 mm long and 4 mm broad; lip shortly 3-lobed, rhomboid, narrowed toward base, 7–10 mm long and as broad; lateral lobes obtuse; median lobe obtuse or obtusely truncate, sometimes minutely mucronate; spur horizontal or slightly turned upward, obtuse, 1–1.5 cm long. June-July. (Plate XLII, Figure 10).

In peat soil of wet valleys and in mountain meadows. — E. Siberia: Ang.-Say. (surroundings of Irkutsk), Dau.; Far East: Ze.-Bu., Uss. Gen. distr.: Jap.-Ch. (N. China, Manchuria). Described from Dauria. Type in Leningrad.

Note: Differs from the related Himalayan species Chusua Donii Nevski nom. nov. (= Orchis Chusua Don) in the large horizontal or upturned and not declined spur.

Genus 345. **TRAUNSTEINERA*** RCHB. f.

Rchb. f. in. Flor. Saxon. (1844) 87.

Sepals lanceolate to ovate-lanceolate, long-acuminate, spatulately enlarged and slightly thickened at apex; petals ovate, acuminate, slightly shorter than sepals; lip broad at base, 3-lobed, the lateral lobes rhomboid, the median lobe oblong; spur less than half the length of ovary, short, slender, conical, obtuse or subobtuse; anthers obovate, obtuse; rostellum 3-lobed, the central appendage projecting between the bases of anther locules, the lateral appendages very short, forming 2 bursicules, these only partly enclosing the glands; pollinia clavate, each with a distinct round hemispherical gland; ovary sessile, fusiform-cylindric, slightly twisted; bracts membranous; tubers undivided, obtuse, ovoid.

1. Flowers lilac-rose; the lip dotted with darker purple; median lobe of the lip oblong, truncate, obscurely emarginate and minutely mucronate in the apical sinus . . . . . 1. T. globosa (L.) Rchb. f.

\+ Flowers white, the lip speckled with purple; median lobe of the lip oblong, attenuate to a linear ligulate tip . . . . . 2. T. sphaerica (M. B.) Schlechter.

* Named for Joseph Traunsteiner (1798–1858), a pharmacist who studied the flora of the NE Tyrol.

T. globosa (L.) Rchb. f. Fl. Sax. (1842) 87. — Orchis globosa L. Syst. nat. ed. 10 (1759) 1242; Ldb. Fl. Ross. IV, 50; Boiss. Fl. Or. V
672 (1884) 66; Shmal'g., Fl. II, 455. — Nigritella globosa Rchb. f., Fl. Germ. Exs. (1830) 121. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 29. — Exs.: Fl. Austr. Hung. No. 3086.

Perennial; stems erect, 30–65 cm long, with 2 membranous obtuse sheaths at base, higher up with 2 or 3 leaves and 1 or 2 foliaceous sheaths; leaves oblong-lanceolate or oblong-obovate, abruptly narrowed to a very short cusp, spreading, 5.5–11 cm long, 1.5–3 cm broad, narrowed at base into a long closed sheath; inflorescence very dense, initially pyramidal, becoming ovoid-spherical, 1.2–4 cm long, 1.4–2.7 cm in diameter; bracts lanceolate, long-acuminate, the lower herbaceous, green, violet-tinged on the margin, equaling or exceeding the ovary; median sepals slightly concave, 5 mm long; lateral sepals 6 mm long; petals slightly shorter than sepals, 3-nerved; lip 4.5 mm long, the distance between the tips of lateral lobes ca. 4 mm; spur 3 mm long. June. (Plate XLI, Figure 1, a).

Wet glades — European part: Crim., M. Dnp. (Vinnitsa); Caucasus: Cisc. Gen. distr.: Bal.-As. Min., Centr. Eur., W. Med.: Described from Europe. Type in London.

2. **T. sphaerica** (M.B.) Schlechter in Monogr. u. Ic. Orch. Eur.I, 7–8 (1928) 227. — Orchis sphaerica M.B. in Fl. Taur.-Cauc. II (1808) 362. — O. globosa L. var. sphaerica Schmalh. in Fl. Sr. and Yuzh. Ross. II (1897) 456. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 28. — Exs.: G. Woronow. Pl. Abchaz. No. 194.

Perennial; stems 25–65 cm long, with 2 obtuse brown membranous sheaths at base, higher up with 2 or 3 erect or slightly spreading leaves and 1 or 2 acuminate sheaths; leaves oblong-lanceolate, 5–13 cm long, 0.6–2 cm broad, abruptly attenuate to a very short cusp, narrowed at base into a long closed sheath; inflorescence very dense, many-flowered, pyramidal or ovoid-spherical, 1.5–4.5 cm long, 1.7–3.2 cm in diameter, bracts green, lanceolate, long-acuminate, commonly as long as or slightly shorter than ovary; flowers white (in dry specimens pale yellowish), the lobes of the lip purple-speckled above; sepals ovate-lanceolate, long-
675 acuminate, spatulately enlarged and slightly thickened at the tip, 3-nerved, 7–8 mm long; petals 3–5-nerved, 5–6 mm long; lip 3-lobed, 6–7 mm long; lateral lobes rhomboid, slightly crenulate on the margin, the distance beteen the lobe tips to 7.5 mm; median lobe oblong, 4 mm long, the linear apical point ca. 1.25–1.5 mm long; spur 3–5 mm long. June-July. (Plate (Plate XLI, Figure 2, a, b,).

High mountain meadows and forest glades. — Caucasus: Cisc., Dag., W., E. and S. Transc. Gen. distr.: Lazistan. Described from Georgia. Type in Leningrad.

Genus 346. **STEVENIELLA*** SCHLECHTER

Schlechter in Fedde, Repert. sp. nov. XV (1918) 392.

Sepals united into an ovoid hood, this 3-toothed at apex; petals small, narrowly linear, obtusish, free, 1-nerved; lip 3-lobed, spurred; spur

* Named for the botanist Christian Steven (born in 1781 in Fredrikshamn [now Hamina, SE Finland], died in 1863 in Simferopol'), who studied the flora of the Crimea and the Caucasus.

Plate XLI

1. Traunsteinera globosa (L.) Rchb. f., flower; 1a) lip with column.– 2. T. sphaerica (M.B.) Schlechter, flower; 2a) lip, 2b) perianth segments.– 3. Orchis Fedtschenkoi E.Czerniak., flower; 3a) lip.– 4. O. pallens L., lip.– 5. O. mascula L., flower and column with anther.– 6. O. caspia Trautv., flower.– 7. O. chlorotica Woron., flower.– 8. O. provincialis Balb., flower.– 9. O. coriophora L., flower.– 10. O. ustulata L., flower.– 11. O. purpurea Huds., lip.– 12. O. maxima C.Koch., lip.– 13. O. Schelkownikovii Woron., lip.– 14. O. punctulata Stev., flower.– 15. O. militaris L., flower, 15a) lip; 15b) pollinarium; 15c) column with anther (schematic).– 16. O. simia Lam.; 16a) flower; 16b) lip.

short, conical, 2-parted at the end; median lobe entire, ligulate, rounded enlarged and thickened at apex; lateral lobes inequilateral, rhomboid, subfalcate, obtuse; column straight; anther ovate-elliptic, obtuse, with subparallel locules; rostellum small, with an appendage projecting between the bases of anther locules, prolonged at base into a reniform-hemispherical pouch, this containing 2 glands adherent to the caudicles of ovoid-clavate pollinia; style semielliptic, concave; ovary sessile, slightly twisted; bracts membranous; tubers ellipsoid.

1. S. satyrioides* (Stev.) Schlechter in Fedde, Repert. sp. nov. XV (1918) 295. — Orchis satyrioides Stev. in Mém. Soc. Nat. Mosc. II (1809) 176, t.XI; Ldb. Fl. Ross. IV, 63. — Himantoglossum satyrioides Spreng. Syst. III (1826) 694. — Peristylus satyrioides Rchb. f. in Bot. Zeitg. VII (1849) 868. — Platanthera satyrioides Rchb. f. Ic. Fl. Germ. XIII-XIV (1851) 166; Boiss. Fl. Or. V (1884) 83. — Coeloglossum satyrioides Nym., Syll. (1855) 359. — Habenaria satyrioides Benth. et Hook. ex Schmalhausen. Fl. Sr. i Yuzh. Ross. II (1897) 463. — Stevenorchis satyrioides Wankow et Kränzl. in Fedde, Repert. Beih. LXV (1931) 45. — Ic.: Rchb. f. l.c. t.85.

Perennial; tubers 10-20 mm long; stems 22-40 cm long, with a solitary leaf slightly above the base, and higher up with 2 amplexicaul green foliaceous acuminate sheaths; leaf lanceolate to oblong-lanceolate, acuminate, 6-14 cm long and 1.5-4 cm broad; inflorescence erect, rather densely 7-20-flowered, 5-13 cm long; bracts commonly less
676 than half the length of ovary, 1-nerved, whitish, slightly lilac-tinged on the margin, lanceolate or ovate-deltoid, acuminate or erose-dentate at apex; flowers spreading; hood 7-10 mm long, green, flushed with brownish-red, composed of the 1-nerved median sepal and the 2-nerved lateral sepals; petals ca. 4 mm long; lip 6-8 mm long, brownish-green, reddish-brown at base, minutely papillose above, when expanded the distance between the tips of lateral lobes 4-4.5 mm; median lobe 4-4.5 mm long; spur 2 mm long. April-May. (Plate XLIII, Figure 1 a-e).

Light woods, thickets, and grassy slopes, in calcareous soil. — European part: Crim.; Caucasus: Dag., E. and W. Transv., Tal. **Gen. distr.**: Iran., Asia Minor (E. part). Described from Georgia. Type in Helsinki.

Genus 347. **COMPERIA**** C. KOCH.

C. Koch. in Linnaea XXII (1849) 287.

Sepals galeately united for 3/4 their length; hood ovate, obtusely 3-toothed at apex; median sepal 3-nerved, elliptic-ovate; lateral sepals 4-nerved, inequilateral, ovate; petals linear, much narrower than sepals, acuminate, slightly enlarged at the middle, with 1-3 long filiform teeth on the margin; lip broadly cuneate, narrowed toward base, 3-lobed; lateral lobes prolonged into very long filiform processes; median lobe 2-parted; with 2 similar long filiform appendages; spur cylindric, obtuse, as long as the ovary; column straight; anther obovate, obtuse, with parallel locules; glands

* i.e., resembling the genus Satyrium.

** Named for Komper, an amateur botanist who lived in Crimea, where he collected plants which he sent on to Steven.

contained in a bursicule; ovary fusiform, slightly twisted, short-stipitate; bracts membranous; tubers obtuse, ovoid or ellipsoid.

1. **C. taurica** C. Koch in Linnaea XXII (1849) 288. — Orchis Comperiana Stev. in Nouv. Mém. Soc. Nat. Mosc. VIII (1829) 253; Ldb. Fl. Ross. V, 63; Boiss. Fl. Or. V (1884) 61; Shmal'g., Fl. II, 453. — Comperia Karduchorum Bornm. et Kränzl. in Bull. Herb. Boiss. III (1895) 141. — Orchis Karduchorum Kränzl. Orch. Gen. et Sp. I (1897) 115. — Comperia Comperiana Asch. et Gr. Synops. III (1907) 620. — Ic.: Steven l.c. t.XII

Perennial; tubers ovoid or ellipsoid; stem (15) 25–50 cm long, 5–7 mm thick, with 2 or 3 (4) leaves below, and 2–4 amplexicaul acuminate pale green sheaths higher up; leaves oblong-lanceolate or oblong-elliptic,
677 subobtuse, narrowed toward base, 6–13 cm long, 2–3.5 cm broad; raceme erect, rather loosely 3–10 (25)-flowered, 7–17 cm long; bracts linear-lanceolate, acuminate, 3–5-nerved, whitish-greenish or suffused with purple, equaling or exceeding the ovary; flowers large; hood dark brownish-purple, greenish at base, 1.3–1.8 cm long; lip whitish-pink, densely and minutely papillose at the base and about the middle above, 3-lobed; lobes triangular, 3-nerved, with filiform appendages to 5.5–6 (7) cm long, whitish-green or greenish-purple; median lobe with 2 such filiform appendages; lateral lobes each with 1 appendage; spur whitish, 1.4–1.8 cm long. May. (Plate XLIII, Figure 2, a, b,).

Light woods. — European part: Crim. Gen. distr.: Asia Minor. Described from the vicinity of Laspi (Crimea). Type in Leningrad.

Genus 348. **ORCHIS*** L.

(Tourn. Inst. 431 tab.247, 248.) L. Gen. Pl. (ed. 1, 270 et ed. 5 (1754) 405).

Subgenus 1. **EU-ORCHIS** I. Klinge. — I. Klinge in A.H.P. XVII (1899) 148.

Sepals oblong-ovate or elliptic-ovate, acuminate or obtusish, contiguous in a hood or the lateral spreading; petals linear or linear-oblong, forming the hood with the median sepal or all the sepals; lip drooping, 3- or 4-lobed, rarely entire, glabrous or minutely papillose above, spurred at base; spur straight or curved, pointed or obtuse, cylindric conical or saccate; column short; anther dorsally adherent, commonly elliptic, with parallel locules, a process of the rostellum at base between the locules; pollinia clavate, the caudicles attached to 2 glands contained in a common 2-celled bursicule; ovary sessile, twisted; tubers undivided, globose or often ovoid or ellipsoid; inflorescence spiciform, with thin membranous bracts.

Note. The dried orchis tubers yield the better sorts of so-called "salep" which is used in medicine. The chief constituent of salep is mucilage (arabin and dextrin), beside starch, proteins, and sugar. The salep mucilage, obtained by agitation of powdered tubers with water, is chiefly used as protective coating in the case of poisoning accompanied by acute gastroenteric disorders. Aphrodisiac properties are ascribed to salep

* The Greek word orchis corresponds to the Latin testiculi.

in popular medicine. The Russian name for Orchis, "yatryshnik", is derived from yatro (or yadro), testicle, alluding to the shape of the tuberoids.

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1. Flowers yellowish or yellowish-green . . . . . 2.
+ Flowers various shades of purple, brownish-purple or light roseate. 6.
2. Lip entire, sometimes minutely notched at apex, broadly ovate to suborbicular . . . . . 10. O. chlorotica Woron.
+ Lip shortly 3-lobed or 4-lobed, the linear lateral lobes arising from base . . . . . 3.
3. Spur horizontal or turned upward, 7–18 mm long; lip broadly 3-lobed. . . . . 4.
+ Spur directed downward, slightly curved, (2.5) 3–6 mm long; lip 4-lobed, two linear lateral lobes arising at base, the larger median lobe 2-lobulate; hood marked within with small purple dots . . . . . 5.
4. Leaves oblong-lanceolate, with brownish-violet spots; spike loose; lip yellowish, the middle part marked with violet or purple dots. . . . . 5. O. provincialis Balb.
+ Leaves not spotted, oblong-obovate; spike dense; lip yellow with darker veins, greenish-yellow at center . . . . . 4. O. pallens L.
5. Median lobe of the lip linear-oblong, reniformly enlarged and shortly 2-lobulate at apex, the lobules as broad as or broader than long. . . . . 18. O. puncticulata Stev.
+ Median lobe of the lip obcordate from a linear-oblong base, 2-lobulate at apex, the lobules commonly twice as long as broad. . . . . 19. O. Schelkownikovii Woron.
6. Flowers very small; sepals 3–4 mm long, forming a blackish-purple or dark brownish-purple hood; lip pale rosulate or whitish with purple speckles . . . . . 12. O. ustulata L.
+ Flowers larger; sepals 5–14 mm long, differing in color . . . . . 7.
7. Bracts very small, 1.25–3 (4) mm long, much shorter than ovary; lip with 2 linear lateral lobes arising at base, the larger median lobe 2-lobulate, with a small linear tooth in the sinus between the lobules. . . . . 8.
+ Bracts larger, linear-lanceolate or lanceolate, (4) 7–25 mm long, equaling or exceeding or rarely somewhat shorter than ovary; lip entire or 3-lobed, the median lobe commonly slightly notched . . . . . 11.

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8. Hood rosulate or greenish-white, densely covered with blackish-purple or bright violet-purple more or less confluent speckles, often blackish-purple or bright purple-violet almost throughout; lip lighter-colored, whitish or pale rose with dark purple speckles . . . . . 9.
+ Hood whitish-rose or grayish rose-lilac, not spotted; lip the color of the hood or darker with light purple lobes. . . . . 10.
9. Hood dotted with blackish-purple; lobules of the median lobe 4.5–6 mm broad, dentate . . . . . 16. O. purpurea Huds.
+ Hood dotted with bright violet or purplish-violet; lobules of the median lobe 2.5–3.5 mm broad, obscurely crenulate at tips . . . . . 17. O. maxima C. Koch.
10. Lobules of the median lobe to 1 cm long, narrowly linear . . . . . 15. O. simia Lam.
+ Lobules of the median lobe short, divergent, obovate or oblong-obovate, to 4 mm long . . . . . 14. O. militaris L.

11. Leaves gradually attenuate from a broad base, long-acuminate, linear. . . . . 1. **O. palustris** Jacq.
+ Leaves more or less distinctly narrowed toward base, obtuse or subobtuse . . . . . 12.
12. Lip entire, sometimes minutely notched . . . . . 13.
+ Lip 3-lobed . . . . . 14.
13. Lip emarginate; spur saccate, 5–6.5 mm long and 3 mm thick . . . . . 11. **O. Fedtschenkoi** E. Czerniak.
+ Lip obovate or obovate-rhomboid from a narrow cuneate base, the margin crenate; spur cylindric, 8–12 mm long, ca. 1.5 mm thick . . . . . 9. **O. caspia** Trautv.
14. Flowers rose-lilac; lip pale rosulate with dark purple speckles, 3-lobed with linear-spatulate lateral lobes arising at base, the median lobe obcordate . . . . . 13. **O. tridentata** Scop.
+ Flowers dingy brownish-purple, purplish-violet or greenish-purple; lip shortly 3-lobed . . . . . 15.
15. Lateral sepals spreading . . . . . 3. **O. mascula** L.
+ All sepals contiguous in a hood, rarely the lateral very slightly divergent . . . . . 16.
680
16. Hood rostrate, dingy brownish-purple; lip 4–5 mm broad, olivaceous, at base whitish with purple dots . . . . . 2. **O. coriophora** L.
+ Hood not rostrate, purple or violet-purple outside; lip 7–13 mm broad, the color of the hood or at center whitish with violet-purple speckles . . . . . 17.
17. Hood purple outside, greenish with brown speckles within; lip red; spur directed downward . . . . . 6. **O. viridifusca** Albov.
+ Hood violet-purple, outside at base sometimes greenish; lip the color of the hood, at center whitish with dark purple speckles; spur horizontal or upturned . . . . . 18.
18. Tubers globose, 0.6–1 (1.2) cm in diameter; spur commonly as long as the lip . . . . . 7. **O. morio** L.
+ Tubers ovoid or ellipsoid, 1–2.2 cm long and 0.8–1.3 cm thick; spur commonly half as long again as the lip . . . . . 8. **O. picta** Lois.

Section 1. **PLATYCHILON** Nevski.— Lip broad, shortly 3-lobed or entire; lateral sepals spreading, rarely contiguous in a hood; bracts 0.6–3 (3.5) cm long, commonly equaling or exceeding the ovary.

Series 1. **Laxiflorae** Nevski.— Leaves gradually attenuate, linear, acuminate; lateral sepals spreading; flowers lilac-purple or very rarely white.

1. **O. palustris** Jacq. Coll. I (1786) 75; Boiss. Fl. Or. V (1884) 76.— O. laxiflora Ldb. Fl. Ross. IV (1853) 57; Shmal'g., Fl. II, 457 (non Lam.).— O. elegans Heuff. in Flora XVIII (1885) 250.— Ic.: C. Ugrinsky, Diagn. sp. trium gen. Orch. (1917) fig. 1.— Exs.: HFR. No. 1682, H. F. A. M. No. 348.

Perennial; tubers ellipsoid, to 3 cm long and 2 cm thick; stem (30) 40–75 cm long; leaves 3–6, linear to linear-lanceolate, channeled, erect,

gradually attenuate from base, acuminate, to 15 cm long and to 2–(2.5) cm broad; spike to 20 cm long, loose; bracts acuminate, faintly purple-tinged on the margin, 1–3.5 cm long, the lower 3–5-nerved; sepals 3-nerved, oblong, obtuse, the median 6–8 mm long, the lateral inequilateral 7–9 mm long; petals resembling the sepals, oblong, obtuse; lip whitish at center with lilac-purple speckles, obovate or rarely obcordate in outline, 9–12 mm
681 long, 9–12 (13) mm broad, 3-lobed; lateral lobes very obtuse; median lobe reniform, emarginate, sometimes obsolescent and the lip apparently obcordate; spur straight or nearly so, 1–1.5 cm long, slender, cylindric, whitish or almost the same color as perianth. May-June.

Wet meadows and swamps. — European part: Bl., M. Dnp., V.-Don, L. V. (Ergeni), Caucasus: Tal., E., W. and S. Transc.; Centr. Asia: Mtn. Turkm., Pam.-Al., Syr D., Balkh. (Ili River valley). Gen. distr.: Scand., Centr. Eur., Atl. Eur., W. Med., Bal.-As. Min., Iran. Described from Austria. Type in Vienna.

O. palustris Jacq. × O. coriophora L. (O. Kelleriana Ugrinsky in Diagn. specier. trium gen. Orchis (editio auct.) p. 5. — O. pseudoparviflora Ugrinsky l.c. — C. Reinhardii Ugrinsky l.c.; Ugrinsky's last two species possibly represent the hybrid O. coriophora L. × O. palustris Jacq.). Leaves lanceolate, acuminate; flowers dull purplish-brown, larger than those of C. coriophora; lateral sepals spreading, rarely contiguous in a hood; lip 3-lobed, semiorbicular, resembling in shape the lip of O. coriophora L. — European part: V.-Don (surroundings of Kharkov), Crimea.

Note. Orchis palustris Jacq. and the W. European O. laxiflora Lam. are distinguished by the very broad obreniform lip, forming a very compound and critical, little explored form cycle, within which some authors are trying to set up a number of other species. There is, however, no doubt that the cycle is represented in the USSR by only one species which is apparently identical with Jacquin's O. palustris. The excellent drawing of this plant, presented by Jacquin in "Icones plantarum rariorum" I (1781–86), Plate 181, and the herbarium material from Europe relating to this species, correspond in the author's view more or less to the plant occurring in the USSR. The W. European form differs only in lower average growth and narrower leaves. The greatest deviation from the type is displayed by some of the Crimean individuals, but these should be referred to O. palustris rather than to O. laxiflora Lam. In agreement with West European botanists, we regard O. elegans Heuff. as a synonym of O. palustris, and that in opposition to K. A. Ugrinsky who proposes separation of these species.

Series 2. **Coriophorae** Nevski. — Leaves subobtuse, narrowed toward base; sepals and petals forming a rostrate hood. — This series also includes O. sanctus L. of Asia Minor.

2. **O. coriophora** L. Sp. Pl. ed. I (1753) 940; Ldb. Fl. Ross. IV, 59; Boiss. Fl. Or. I (1884) 61; Shmal'g., Fl. II, 455. — O. cassidea M.B. Fl. Taur.-Cauc. III (1819) 600. — O. fragrans Wulff Fl. Taur. I, 3 (1930) 100, nec. Poll. — Ic.: Rchb. Ic. Fl. Germ. XIII–XIV (1851) t. 15. — Exs.: Fl. Austr.-Hung. No. 3087.

682 Perennial; tubers ellipsoid, to 2.4 cm long; stem 15–40 (50) cm long, leafy up to the middle, with foliaceous acuminate progressively smaller

sheaths above; leaves 4–8, narrowly linear or linear or linear-lanceolate, (3.5) 4.5–13 cm long, 0.4–1 (1.5) cm broad, attenuate, obtuse; spike cylindric, densely many-flowered, 3.5–13 (14) cm long, 1.5–3 cm broad; bracts linear-lanceolate or linear, long-acuminate, 1-nerved, green or on the margin purple, the lower commonly equaling the flower to 2 cm long, the upper 0.55–0.8 cm long; flowers dingy brownish-purple, with the odor (in the typical form) of forest bugs; sepals linear-lanceolate, (0.4) 0.5–0.7 (0.9) cm long; lip 3-lobed, 4–6 (6.5) mm long, between the tips of lateral lobes 4–5 mm broad; median lobe oblong, obtuse; lateral lobes commonly slightly and obtusely dentate on the outer margin; spur cylindric-conical, slightly curved, 4–7 (8) mm long. O. cassidea M.B. differs from type in broader leaves (to 1.5 cm broad as against 0.8 cm in the type) and possibly in the scent of flowers; Crimea, Caucasus. O. pseudofragrans Nevski sp. ined. is distinguished from typical specimens of O. coriophora by its hood which is more long-pointed, pale dingy olivaceous-purple, 0.9–1 cm long. (Caucasus: Tal., E. Transc.). May-June. (Plate XLI, Figure 9).

Wet meadows. — European part: U. Dnp., M. Dnp., Bl., V.-Don., L. V., Crim.; Caucasus: Cisc., Dag., W., E. and S. Transc., Tal. **Gen. distr.**: var. typica; Centr. Eur., Atl. Eur., Bal.-As. Min. (N. part); var. fragrans (Poll.) Boiss.: W. Med. (Portugal, Spain, S. France, Italy, N. Africa), Bal.-As. Min. (W. part: Greece); var. pseudofragrans Nevski: Iran., E. Med.; var. cassidea (M.B.) Nevski: Arm.-Kurd., Asia Minor. Described from Europe. Type in London.

Note. Most systematicians have refrained from separating O. fragrans as a distinct species. However, Pollini himself (Fl. Veron. II (1824) 7) had written that O. coriophora L. and O. fragrans Poll. differ in the scent of flowers. While the former has the unpleasant odor of forest bugs, the latter according to Pollini, has the fragrance of Crataegus monogyna or C. oxyacantha L. In the author's opinion, O. fragrans can be considered as an independent species since, apart from scent, it is distinguished by the large purple-colored long-pointed hood; this species, however, does not occur in the USSR and its distribution is confined to the W. Mediterranean region. E. V. Vul'f reports it for Crimea, but the Crimean specimens would be more appropriately named O. cassidea, if considered a distinct species at all. Most closely related to O. fragrans is the new variety (or species) O. coriophora L. var. pseudofragrans Nevski, that occurs in Talysh and in E. Transcaucasia, as well as in Persia and Syria. It is distinguishable from O. fragrans by its long narrow and loose inflorescence. There is no information concerning its scent.

683 Series 3. **Masculae** Nevski. — Leaves narrowed toward base, oblong-obovate or broadly lanceolate; lateral sepals spreading; spur horizontal or slightly turned upward.

3. **O. mascula** L. Flora Suec. ed. 2 (1755) 310; Ldb. Fl. Ross. IV, 56; Boiss. Fl. Or. V (1884) 68; Shmal'g., Fl. II, 456; Kryl., Fl. Zap. Sib. III, 683. — O. Wanjkovii Wulff, Flora Taur. I, 3 (1930) 97. — O. pinetorum Boiss. et Kry., Fl. Or. V (1884) 68. — O. olbiensis

Reuter in Ard. Fl. Alp. Mar. (1867) 353. — O. Parreisii Presl. Reliq. Bem. (1844) 112. — O. speciosa Host. Fl. Austr. II (1831) 527. — Ic.: Rchb. Ic. Fl. Germ. XIII–XIV (1851) t. 38. — Exs.: Pl. Finl. exs. No. 538.

Perennial; tubers broadly ovaloid to subglobose; stem violet-speckled in lower part, rarely unspeckled, 20–50 cm long, leafy in lower part, higher up with 1 or 2 amplexicaul acuminate foliaceous sheaths; leaves commonly speckled with purplish-violet, 7–14 cm long, 1.5–3.5 cm broad; spike densely many-flowered, cylindric, 6–18 cm long and to 4–4.5 cm broad; bracts lilac-tinged, lanceolate, acuminate, 1-nerved or rarely the lower ones obscurely 3-nerved, about as long as or slightly shorter than ovary; flowers purple or pale violet; lip whitish at base with dark purplish-violet speckles; sepals oblong-ovate or ovate-lanceolate, acuminate or subobtuse; median sepal 3-nerved, 7–8 mm long; lateral sepals inequilateral, 2- or 3-nerved, 8–10 mm long, 3–3.5 mm broad; petals obtusish, 3-nerved, slightly shorter than the median sepal; lip minutely papillose above, broadly oval, 3-lobed, 7–12 mm long, 7.5–12 mm broad between the tips of lateral lobes; lateral lobes broad, obliquely ovate; median lobe commonly shallowly incised-retuse, semiquadrate, broader than the lateral lobes; spur horizontal or slightly ascending, obtuse, 1–1.5 cm long, lilac-tinged. (April)-May. (Plate XLI, Figure 5).

Thickets and forest glades. — European part: U. Dnp. (according to Schmalhausen), V.-Ka., Crim.; Caucasus: Cisc., W., E. and S. Transc., Tal. Gen. distr.: Scand., Centr. Eur., W. Med., Atl. Eur., Bal.-As. Min., E. Med., Iran. Described from Gotland Island. Type in London.

O. mascula L. × O. provincialis Balb. — Leaves lanceolate or broadly lanceolate, dark-spotted; bracts very faintly lilac-tinged; lip with few darker speckles at base; pollinia dingy greenish; stem green. European part: Crim.

O. mascula L. × O. pallens L. — Flowers flesh-colored, with the scent of O. pallens L. This hybrid is reported by E. V. Vul'f from Crimea, but the color is given as pale or dark pink.

684 Note. The species O. Wanjkovii, described by E. V. Vul'f does not differ in any way from O. mascula. Similarly, the plant described by Boissier under the name O. pinetorum Boiss. et Ky. merely represents a simple modification of O. mascula, distinguished by somewhat smaller bracts and paler flowers. O. anatolica Boiss. has been erroneously reported for the Crimea and the Caucasus (the very same O. mascula having been mistaken for that species).

4. **O. pallens** L. Mant. pl. alt. II (1771) 292; Ldb. Fl. Ross. IV, 56; Boiss. Fl. Or. V (1884) 68. — O. pseudopallens C. Koch, in Linnaea XIX (1847) 13. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 34. — Exs.: Herb. Fl. Cauc. No. 209.

Perennial; tubers ovoid-ellipsoid, to 2.5 cm long and 1.5 cm thick; stem 15–35 cm long, with 2 whitish membranous obtuse sheaths at base, 3–5 approximate leaves a little higher up, and above the leaves a solitary amplexicaul acuminate foliaceous sheath; leaves obtuse, narrowed toward base, oblong-ovate, green; spike densely many-flowered, 3.5–7 cm long, 3–4 cm broad, ovoid or short-cylindric; bracts lanceolate, commonly equaling the ovary, 1–1.3 cm long, to 4 mm broad, 1-nerved, yellowish; flowers pale yellow, the scent resembling that of Sambucus nigra

flowers; median sepal slightly concave, oblong-elliptic, obtuse, 1-nerved, 7–8 mm long; lateral sepals inequilateral, 3-nerved, oblong-ovate, 8–9 mm long; petals obtuse, 5–6 mm long; lip brighter yellow than sepals and petals, dark-veined, yellowish-green at center, broadly rounded-ovate, 7–8.5 mm long, 7.5–10 mm broad, rather shallowly 3-lobed, minutely papillose above, rounded at base; lateral lobes semioval, obtuse; median lobe broadly quadrate, obtuse, slightly notched or entire; spur cylindric, obtuse, 7–11 mm long, slightly shorter than ovary. April-May. (Plate XLI, Figure 4).

Mountain meadows and forest glades. — European part: Crim.; Caucasus: W. and E. Transc. **Gen. distr.**: Centr. Eur., W. Med., Bal.-As. Min. Described from Europe. Type in London.

O. pallens L. × O. provincialis Balb. — Leaves oblong-ovate, as in O. pallens, but dark-spotted; spur 1/2–3/4 the length of ovary. Recorded by E. V. Vul'f for the Crimea. He also reports for the Crimea the hybrid O. pallens L. × provincialis Balb. × mascula L., but the author rather doubts the formation of such a hybrid.

Series 4. **Provinciales** Nevski. — Leaves narrowed toward base, oblong-lanceolate, with dark spots; lateral sepals spreading; spur turned upward, cylindric. Of the species occurring outside the USSR, O. pauciflora Ten. (nec Fisch.) also belongs to this series.

685 5. **O. provincialis** Balb. Misc. alt. (1806) 33; Boiss. Fl. Or. V (1884) 69. — Ic.: Balb. l.c. t. 2; Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 35.

Perennial; tubers oblong-ovoid or ellipsoid; stem 15–35 (37) cm long, with 3–7 leaves at base and 2 or 3 green, acuminate foliaceous sheaths higher up; leaves narrowly lanceolate to oblong-lanceolate, covered above with brownish-violet spots that disappear in drying; spike loosely 5-18 (20)-flowered, cylindric, 3–14 cm long, 3–4.5 cm broad; bracts about equaling the ovary, 1–2.4 cm long, lanceolate, acuminate, the lower 3-nerved, the upper 1-nerved; flowers pale yellowish or whitish-creamy; lip a deeper yellow shade, with small violet or brownish-purple speckles at center; sepals with 3 green veins each; lateral sepals ovate-lanceolate, 10–13 mm long; median sepal oblong, (9) 10–12 mm long, mitrate at apex; petals obscurely 3-nerved; sometimes with a lilac spot, ovate-oblong, obtuse, obscurely notched at apex, 9–10 mm long, united with the median sepal into a hood; lip suborbicular in outline but longitudinally folded, 10–13 mm long, 1–15 mm broad, 3-lobed; median lobe subquadrate, obtusely truncate, slightly notched, 2.5–3 mm long, 5–5.5 mm broad; lateral lobes triangular, obtusish; spur obtuse; 14–18 mm long. April-May. (Plate XLI, Figure 8).

Mountain meadows and thickets on mountain slopes. — European part: Crim., Caucasus: W. Transc. (Sochi). **Gen. distr.**: W. Med., Bal.-As. Min. (W. part). Described from SE France.

Series 5. **Patentes** Nevski. — Leaves narrowed toward base; lateral sepals scarcely spreading or decidedly contiguous in a hood; lip deeply 3-lobed; spur directed downward.

6. O. **viridifusca** Albov, Prodr. Fl. Colch. (1895) 229. — Ic.: R. Schlechter, Monogr. u. Icon. Orch. Eur. I, 5–6 (1927) t. 22, fig. 86.

Perennial; tubers ovoid; stem 20–30 cm long, with 3 or 4 leaves at base and 2 amplexicaul acuminate sheaths higher up; leaves lance-obovate, short-acuminate or round-tipped and very obtuse, to 12 cm long and 1–3.3 cm broad; spike oblong, to 7 cm long and ca. 3.3 cm in diameter, 10–15-flowered; bracts linear-lanceolate, strongly acuminate, 1- or few-nerved, equaling or exceeding the ovary; flowers greenish-purple; sepals
686 contiguous in a hood or the lateral scarcely spreading, red outside, green and brown-speckled within; lip red, with a purple throat; petals oblong-ovate, obtuse, slightly smaller than sepals, ca. 7 mm long, 3-nerved, also obtuse; lip broadly ovate in outline, minutely papillose above; median lobe obtuse, slightly notched; lateral lobes narrower, inequilateral, obtuse, irregularly dentate; spur cylindric-conical, rather stout, more than half the length of ovary (7 mm long).

High mountain meadows. — Caucasus: W. Transc. Endemic. Described from Abkhazia. Type in Geneva. Type in Tiflis.

Note. The series also contains the W. Mediterranean O. patens Desf., with a shorter saccate spur.

Series 6. **Pictae** Nevski. — Leaves slightly narrowed toward base, oblong-lanceolate; sepals contiguous in a hood; lip broad, shortly 3-lobed; spur horizontal, cylindric.

7. O. **morio** L. Sp. Pl. ed. 1 (1753) 940; Ldb. Fl. Ross. IV, 60; p. pt.; Boiss. Fl. Or. V (1884) 60 p. pt.; Shmal'g., Fl. II, 456, p. pt. — Ic.: Fl. Dan. t. 253. — Exs.: Fl. Austro-Hung. No. 675.

Perennial; tubers globose, 0.6–1 (1.2) cm in diameter; stem (9) 10–25 (28) cm long, with 5–8 leaves at base and higher up, nearly right up to the spike, with 3 or 4 foliaceous acuminate sheaths; leaves linear-oblong or narrowly lanceolate, obtusely attenuate or obtuse, (2) 2.5–7 cm long, 0.5–1.7 cm broad; spike rather loosely (2) 4–19-flowered, 2–7.5 cm long, 2–3.5 cm in diameter; bracts lanceolate, lilac-tinged, acuminate, 1–1.5 (2) cm long, the lower 3–5 nerved and equaling the ovary; flowers spreading, violet-purple, the lip whitish at center with dark purple speckles; sepals commonly brownish-green outside at base, with veins of the same color, oblong-ovate, 6–9 (10) mm long, to 3.5–(4) mm broad, obtuse, 5-nerved; petals oblong, slightly shorter than petals; lip rounded-reniform or subreniform, 6–9 mm long, 9–13 mm broad, rather shallowly 3-lobed in fruit; median lobe slightly notched, obtuse, semiquadrate; spur slightly turned upward or subhorizontal, commonly as long as or just longer than the lip, 6–9 (9.5) mm long, obtuse, suffused with lilac-purple. May-June.

Meadows and forest glades. — European part: U. Dnp., M. Dnp., V.-Don. (Kharkov), Bl. Gen. distr.: Scand., Atl. Eur., Centr. Eur. Described from Europe. Type in London.

8. O. **picta** Lois., Mém. Soc. Linn. Par. XI (1827) 431. — O. morio L. var. picta Rchb. f., lc. Fl. Germ. XIII–XIV (1851) 23. — O. morio L. var. caucasica C. Koch. in Linnaea XXII (1849) 280. — O. Scorpili
687 Velen. in Oesterr. Bot. Zeitschr. (1886) 267. — Exs.: Fl. Cauc. exs. No. 31, 31b.

Perennial; tubers ovoid or ellipsoid, 1–2.2 cm long, 0.8–1.3 cm in diameter; stem 14–35 (40) cm long, with 5–7 leaves at base and higher up, nearly right up to the spike, with 3–5 foliaceous acuminate sheaths; leaves narrowly lanceolate or oblong-ovate, obtuse or obtusely attenuate, 2.5–10 cm long, 0.7–1.8 cm broad, often folded lengthwise and arched-recurved; spike rather loosely 6–21-flowered, cylindric, 2.6–11 cm long, 2–4 cm in diameter; bracts lanceolate to broadly lanceolate, strongly acuminate, lilac, 1–1.5 cm long, equaling the ovary; flowers slightly smaller than those of O. morio, spreading, bright purple-violet; lip whitish at center, with dark purple speckles; sepals faintly brownish outside at base, with dark veins, 5–9 mm long, 2–3.5 mm broad, oblong-ovate or oblong, obtuse; petals slightly shorter; lip rounded-reniform, 0.5–0.8 cm long, 0.7–1.2 cm broad, rather shallowly 3-lobed in front; median lobe semiquadrate, slightly notched, obtuse; lateral lobes inequilateral, also obtuse; spur obtuse, often slightly turned upward, 0.7–1.2 cm long, mostly half as long again as the lip. April-May.

Thickets, glades, and meadows. — European part: Crim.; Caucasus: Cisc., Dag., W. and E. Transc., Tal. **Gen. distr.**: W. Med., Bal.-As. Min., E. Med. Described from Toulon.

O. picta Lois. × O. coriophora L. — Flowers faintly scented; hood purple; lip brownish-violet, 3-lobed, broad, with dark purple dots at center; spur pointed, about the length of ovary. — European part: Crimea.

O. picta Lois. × O. caspia Trautv. — Tubers elongate-ovoid; leaves more pointed than in O. picta; flowers purple (not violet-purple as in O. picta); lip practically plain, obscurely speckled; rhomboid, tapering and strongly narrowed toward base, entire or perceptibly 3-lobed, minutely crenulate; bracts as in O. picta Lois.; spur directed dornward, as in the case of O. caspia. — Caucasus: E. Transc.

Note. Up till now, both O. morio L. and O. picta Lois. have been reported for the Caucasus and the Crimea. But all the author's attempts to distinguish between these two species with Caucasian and Crimean material have proved unsuccessful and he has arrived at the conclusion that the only species that grows in the Crimea and the Caucasus is Orchis picta Lois. This species is distinguishable from O. morio by slight and not always clearly pronounced characters. The true O. morio occurs in the western and south-western border area of the USSR and it is distributed through Scandinavia and the northern part of central Europe. We thus consider O. picta as its southern race, distributed in the Mediterranean region. The original O. picta Lois. from the surroundings
688 of Toulon differs slightly from Crimean and Caucasian plants in a looser few-flowered inflorescence and conforms fully to Reichenbach's illustration (Ic. Fl. Germ. XIII–XIV (1852), Plate 13, fig. 1–3). A similar representation is given by J. L. A. Loiseleur Deslonchamps in "Flora Gallica" (II (1928), Plate 26), the tubers appearing in the drawing having the typical ellipsoid shape.

Series 7. **Papilionaceae** Nevski. — Leaves oblong, narrowed toward base; sepals and petals forming a hood; lip entire, narrowed toward base; spur cylindric, obtusely attenuate, directed downward.

9. O. caspia Trautv. in A.H.P. II (1873) 434. — O. papilionacea L. β Bruhnsiana Gruner, Plant. Bakuens. Bruhnsii (1868) 74. — O. Bruhnsianus Majorov ex Grossh., Fl. Kavk. I (1928) 263. — O. papilionaceus ssp. Bruhnsianus Soó in Keller u. Schlechter Monogr. u. Ic. Or. Eur. II (1932) 136. — O. schirvanica Woron. in Mitteil. Kauk. Mus. IV (1909) 263. — O. papilionaceus ssp. schirvanicus Soó, Rev. Orch. Südosteur. u. Südwestas. (1928) 36. — Ic.: R. Schlechter Monogr. u. Icon. Orch. Eur. I, 5-6 (1927) t. 23, fig. 90. — Exs.: Herb. Fl. cauc. No. 23.

Perennial; tubers oblong-ovoid, to 2.8 cm long and 1.7 cm thick; stem 12-30 cm long; leaves 5 or 6, to 9 cm long and 1.5 cm cm broad, sometimes folded lengthwise and falcately spreading, obtuse, gathered on the lower part of the stem; foliaceous sheaths higher up the stem 3 or 4, large, amplexicaul, free above, acuminate; spike rather dense, oblong to oblong-ovoid, 3-7 (12) cm long and to 4-4.5 cm in diameter; bracts large, exceeding the ovary, purple-tinged, lanceolate, acuminate, 5-7-nerved; flowers purple; sepals obtuse, 8-10 mm long, 3-nerved, oblong-lanceolate, with darker nerves, the lateral inequilateral; petals oblong-linear, 3-nerved, slightly shorter than sepals; lip to 11 mm long and to 7.5 mm broad, obovate or obovate-rhomboid from a narrow cuneate base, denticulate or crenulate, obtuse, paler at center, sometimes purple-speckled; spur paler, 8-10 (12) mm long, slightly curved. April-May. (Plate XLI, Figure 6).

Grassy slopes and thickets— Caucasus: E. Transc., Dag. Gen. distr.: Iran. Described from the surroundings of Baku. Type in Leningrad.

Note. A characteristic representative of the series Papilionaceae is the W. Mediterranean O. papilionacea which differs from O. caspia in its large and broad lip.

Series 8. Saccatae Nevski. — Leaves slightly narrowed toward base; sepals spreading; lip entire or notched at apex; spur saccate.

689 10. O. chlorotica Woron. in Mitteil. Kauk. Mus. IV (1909) 265. — O. papilionaceus ssp. chloroticus Soó, Revis. Orch. Südosteur. u. Südwestas. (1928) 36. — Ic.: R. Schlechter, Monogr. u. Ic. Orch. Eur., I, 5-6 (1927) t. 23, fig. 91.

Perennial; tubers oblong-ovoid; stem 20-30 cm long; leaves 4-6, on the lower part of the stem; foliaceous sheaths higher up the stem, acuminate, amplexicaul; leaves oblong-obovate to oblong-oblanceolate, 4-8.5 cm long and to 2.5 cm broad, obtuse; spike oblong, 5-11 cm long, to 3 cm broad; bracts yellowish-green, lanceolate, acuminate, to 3 cm long, slightly exceeding or equaling the flower; flowers about 15, greenish-yellow; median sepal oblong, obtuse, 7-8 mm long; lateral sepals inequilateral, oblong-lanceolate, 9-10 mm long; petals oblong-linear to linear, forming a hood together with the median sepal; lip whitish at center and at throat, broadly ovate to suborbicular, obtuse or slightly notched at apex, 9-10 mm long and 9 mm broad; spur whitish, stout, 5-6.5 mm long, to 2.5 mm thick, obtusely attenuate, less than half the length of ovary, directed downward. April. (Plate XLI, Figure 7).

Thickets. — Caucasus: E. Transc. Endemic. Described from the Al'dzhigyan-chai River. Type in Tiflis; cotype in Leningrad.

Note. A species closely related to O. saccata Ten. and O. Fedtschenkoi E.Czerniak., but differs in the rather pointed spur and the greenish-yellow flowers.

11. O. Fedtschenkoi E.Czerniak. in Not. Syst. ex Herb. Horti Bot. Petrop. III (1922) 147. — O. saccata ssp. Fedtschenkoi Soó, Rev. Orch. Südosteur. u. Südwestas. (1928) 51. — Ic.: R.Schlechter, Monogr. u. Ic. Orch. Eur. I, 5–6 (1927) t. 22, fig. 88.

Perennial; tubers ovoid, 2–2.5 cm long and to 1.5 cm thick; stem 27 cm long, with 5 or 6 leaves in lower part and higher up with 4 foliaceous amplexicaul acuminate sheaths 4–5 cm long; leaves oblong-ovate, obtusely attenuate, 6–7 cm long, 2–3 cm broad; spike erect, densely 10–13-flowered, 9 cm long, 2.5 cm broad; bracts lanceolate, acuminate, 1.5–2.5 cm long, 0.7 cm broad, 5-nerved, greenish, about equaling the flower; flowers violet; sepals ovate-lanceolate; lateral sepals inequilateral, obtuse, 3-nerved 8–10 mm long, 4 mm broad at base, spreading; median sepal 8 mm broad, concave; petals lanceolate, inequilateral, tapering and slightly elongate at apex, obtuse, 1-nerved, forming a hood together with the median sepal; lip rounded-ovate, 0.8–1 cm long and as broad, slightly notched at apex; lateral lobes minute, obtuse, barely perceptible; spur
690 5–6.5 mm long, 3 mm thick, obtuse, scarcely enlarged from base, nearly straight, whitish, half the length of ovary. April. (Plate XLI, Figure 3, a).

Thickets on mountain slopes. — Centr. Asia: Mtn. Turkm. Endemic. Described from Tutli-bil' in Kara-Kala area. Type in Leningrad.

Section 2. **ANTHROPOCHILON** Nevski. — Lip suggestive in outline of the shape of the human body; lateral lobes arising at base, linear-oblong; median lobe relatively large, 2-lobulate at apex; sepals and petals forming a hood; bracts commonly very small, 1–4 mm long, much shorter than ovary, rarely (in O. tridentata) to 10 mm long and about equaling the ovary.

Series 9. **Ustulatae** Nevski. — Flowers very small, 3–4 mm long; bracts half the length of ovary.

12. **O. ustulata** L. Sp. Pl. ed. 1 (1753) 941; Ld. Fl. Ross. IV, 63; Boiss. Fl. Or. V (1884) 61; Shmal'g., Fl. II, 495; Kryl., Fl. Zap. Sib. III, 681. — Ic.: Rchb. f. Ic. Fl. Germ. XIV (1851) t. 16. — Exs.: HFR No. 1041; Fl. pl. exs. No. 681.

Perennial; tubers ovoid or rarely subglobose, 1–1.7 cm long, 0.7–1 cm thick; stem (10) 15–30 (45) cm long, leafy for two-thirds its length, higher up with acuminate foliaceous sheaths; leaves oblong-lanceolate, narrowed toward base, obtusish, abruptly attenuate to a small point, slightly spreading, 3–8 cm long, 0.5–1.5 (2) cm broad; spike densely many-flowered, cylindric, 3–10 cm long, 1–2 cm in diameter, relatively loose

in lower part; bracts 1-nerved, lanceolate to ovate-lanceolate, acuminate, half or less than half, the length of ovary (rarely nearly as long as ovary) 3–4 mm long, lilac; flowers honey-scented; hood blackish-purple, obtusish; petals rosulate; lip pale rose or whitish speckled with purple; spur white; sepals ovate, the lateral inequilateral and somewhat longer than the median; petals linear-oblong; lip slightly exceeding the sepals, 4–5 mm long; lateral lobes arising from base, oblong-linear, obtuse; median lobe gradually enlarged toward apex, shortly bilobulate, the lobules subobtuse and slightly denticulate; distance between tip of lateral lobes ca. 4.5–5 mm, between the tips of lobules of the median lobe ca. 2.5 mm; lateral lobes 2–3 mm long and 0.75–1 mm broad; spur 1 mm long, obtuse, directed downward and slightly arched. June-July. (Plate XLI, Figure 10).

Glades and margins of deciduous woods. — European part: Lad.-Ilm., U. Dnp., V.-Don, U. V. V.-Ka., M. Dnp., Bl., L. Don, Dv.-Pech?
691 (former Arkhangel'sk Province?); W. Siberia: Ob, U. Tob.; Caucasus: Cisc., E. Transc. Gen. distr.: Scand., Centr. Eur., Atl. Eur., W. Med., Bal.-As. Min. (W. part). Described from Europe. Type in London.

Series 10. **Tridentatae** Nevski. — Hood 8–9 mm long; bracts about the length of ovary.

13. **O. tridentata** Scop. Fl. Carn. ed. 2 II (1772) 190; Boiss. Fl. Or. V (1884) 62; Shmal'g., Fl. II, 454. — O. variegata All. Fl. Pedem. II (1785) 147; Ldb. Fl. Ross. IV, 61. — O. taurica Lindl. Gen. et Sp. Orch. (1835) 271. — O. commutata Tod. Orch. Sic. (1842) 24. — O. brevilabris Fisch. et Mey. Ann. Sc. Nat. Sér. IV, 1. (1854) 30. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 19. — Exs.: Fl. Austro-Hung. No. 673.

Perennial; tubers ovoid or ellipsoid; stem 15–38 (45) cm long, with 3–6 leaves in lower part and higher up with 2–5 acuminate amplexicaul foliaceous sheaths; leaves oblong-lanceolate to lanceolate, obtusely attenuate, narrowed toward base, 5–9 cm long, 1–2 cm broad; spike dense, ovoid to subspherical, 2–4.5 cm long, 2.2–3.7 cm in diameter; bracts lanceolate, strongly acuminate, 1-nerved, suffused with lilac-purple except the green nerve, slightly shorter than or nearly equaling the ovary, 4–10 mm long; flowers rose-lilac, the lip pale rose (sometimes almost white) with dark purple speckles; sepals ovate-lanceolate, long-acuminate, 8–9 mm long; median sepal 1-nerved; lateral sepals inequilateral, 2-nerved; all sepals connivent in a hood; petals oblong, obtusish, 1-nerved, shorter than sepals; lip 3-lobed; lateral sepals arising at base, linear-spatulate, bidentate at apex; median lobe obcordate, narrowed toward base, emarginate and crenate at apex; entire lip 7–9 mm long, between the tips of lateral lobes 7–8 mm broad, the median lobe 5–5.5 cm broad; spur shorter than ovary, 5–7 mm long, 1 mm thick, directed downward, cylindric, obtuse, slightly curved. April-June.

Meadows and forest glades. — European part: Crim., Caucasus: Cisc., Dag., W. and E. Transc., Tal. Gen. distr.: Centr. Eur. (S. part), W. Med., E. Med., Bal.-As. Min. Described from Idrija [Yugoslavia].

Series 11. **Militares** Nevski. — Bracts small, scalelike; hood pale pink or pale grayish-violet.

14. O. militaris L. Sp. Pl. ed. I (1753) 941, ex parte; Ldb. Fl. Ross. IV, 61; Boiss. Fl. Or. V (1884) 64; Shmal'g., Fl. II, 454; Kryl., Fl. Zap. Sib. III, 628. — Strateuma militaris Salisb. in Trans. Hort. Soc. I (1812) 290. — Orchis Rivini Gouan. III (1775) t. 74. — O. Raddeana Rgl. Ind. Sem. Horti Petrop. Suppl. (1869) p. 22 (n.v.). —
692 O. Steveni auct. fl. cauc., p. pte. — O. militaris L. var. sibirica Schlechter in Keller et Schlechter Monogr. u. Ic. Orch. Eur. I (1928) 220. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 24. — Exs.: HFR No. 992.

Perennial; tubers ovoid; stem 20–45 cm long, with 2 whitish membranous sheaths at bse, 3–5 leaves above the base, and 2 amplexicaul sheathing acuminate leaves higher up the stem; leaves oblong-elliptic or elliptic, obtuse, narrowed toward base, 8–18 cm long, 2.5–5 cm broad; spike densely many-flowered, initially pyramidal, becoming cylindric, 4–10 cm long, 3.5–5 cm in diameter; bracts violet-rosulate, ovate, acuminate, 2–3 mm long; flowers scented; sepals ovate-lanceolate, acuminate, 1-nerved, slightly shorter than and one-third as broad as the sepals, pinkish; lip at base whitish purple-speckled and minutely papillose, the lobes violet-rose; lip 10–14 mm long; lateral lobes arising from base, linear, to 8 cm long and 1 mm broad; middle lobe larger, cuneate or obcordate from a linear-oblong base, 2-lobulate at apex, with a subulate tooth at sinus, the oblong-obovate lobules to 4 mm long; lip between the tips of lateral lobes 7–10 mm broad, the median lobe 2 mm broad at base and 6–8 mm between the tips of apical lobules; spur whitish or pale pink, obtuse, narrowly cylindric, slightly curved, 5–6 mm long, half the length of ovary. May-June. (Plate XLI, Figure 15, a–c).

Damp meadows, glades and wood margins. — European part: Lad.-Ilm., U. V., V.-Ka., U. Dnp., V.-Don, M. Dnp., Bl., Crim., Transv.; W. Siberia: U. Tob., Ob, Alt., Irt., Yen.; E. Siberia: Ang.-Say., Dau.; Caucasus: Cisc., W. and E. Transc. Gen. distr.: Scand., Atl. Eur., Centr. Eur., W. Med., Bal.-As. Min., Iran., Mong. Described from Europe. Type in London.

O. militaris L. × O. purpurea Huds. — Spike cylindric, dense, to 15–20 cm long; hood marked with dark purple lines and dots, but lighter in color that that of O. purpurea, 1–1.1 cm long; lip intermediate in shape between O. purpurea and O. militaris; apical lobules of the median lobe 5–6 mm long and 2.75–3 mm broad, with obtusely dentate margin (in O. militaris entire or nearly so, in O. purpurea dentation more pronounced); spur ca. 5 mm long and 2 mm thick. — European part: Crimea.

O. militaris L. × O. simia Lam. (O. Steveni Rchb. f. in Bot. Ztg. (1849) 829; Ic. Fl. Germ. XIII–XIV (1851); Plate 20); hood pale
693 rosulate, to 1.2 cm long; lobules of the median lobe of the lip longer and narrower (0.9–1.5 mm broad) and more directed to the front as compared with O. militaris, but shorter and broader than in the case of O. simila Lam. — European part: Crim.; Caucasus: Cisc.

Note. Orchis Steveni Rchb. f. remains as yet as a problematic species. The illustration given by Reichenbach indicates clearly that the plant concerned is intermediate in all characters between O. militaris and O. simia. This applies particularly to labellum shape. It is possible, however, that the future solution of the O. Steveni problem will tend towards synonymity with O. militaris. As a matter of fact, Caucasian

specimens of O. militaris often deviate from the typical form in having longer lobules of the median labellum lobe (though not nearly as long as in the O. Steveni illustration) as well as a longer inflorescence, but there is no reason for considering them on these grounds as belonging to a different species. Yu.N. Voronov and A.A. Grossheim erroneously assumed some of the Caucasian specimens to be a distinct species — O. Steveni. Boissier as well, in reporting O. Steveni for Persia, was dealing in fact with Orchis militaris L. — My assumption concerning the hybrid nature of O. Steveni Rchb. finds confirmation in M. Godfery's publication; "Monogr. a Icon. Brit. Orch." (1933) which includes an illustration of the hybrid O. militaris × O. simia. This illustration is strongly reminiscent of Reichenbach's drawing (l.c.) of O. Steveni.

15. **O. simia** Lam. Fl. France III (1778) 507; Boiss. Fl. Or. V (1884) 62; Shmal'g., Fl. II, 454. — O. tephrosanthos Vill. Fl. Dauph. II (1787) 32; Ldb. Fl. Ross. IV (1853) 62. — Ic.: Rchb. Ic. Fl. Germ. XIII–XIV (1851) t. 21. — Exs.: Fl. cauc. exs. No. 82; Herb. Fl. Cauc. No. 24.

Perennial; tubers ovoid or ellipsoid; stem 20–45 cm long, with 4 or 5 leaves above the base, and higher up with 1 or 2 amplexicaul foliaceous sheaths higher up; leaves oblong-lanceolate, obtuse or subobtuse, narrowed toward base, 5.5–15 cm long, 2–3.5 cm broad; spike densely many-flowered, ovoid at anthesis, 3–7 (8) cm long, 3–4 cm broad; bracts 1.25–3 (4) mm long, ovate to ovate-lanceolate, acuminate, whitish; sepals pale grayish-violet or pale grayish-purple, connate at base, ovate-lanceolate, strongly acuminate, 3-nerved, 1–1.4 cm long, the lateral inequilateral; petals linear, acuminate, 1-nerved, almost white, slightly shorter than sepals; lip pale purple or light pink; median lobe in undivided portion paler and purple-speckled; lateral lobes arising on each side of the base, narrowly linear, curved, to 7.5 mm long; median lobe oblong-linear with 2 oblong-linear, curved apical lobules 8–11 mm long and a subulate tooth 2–3 mm
694 long at sinus; entire lip 1.4–1.5 cm long; spur cylindric, obtuse, 4–5 mm long and ca. 1.5–1.75 mm thick, half the length of ovary, directed downward or scarcely recurved. April-May. (Plate XLI, Figure 16, a,b).

Thickets on mountain slopes, glades, and mountain meadows. — European part: Crim.; Caucasus: Cisc., W., E. and S. Transc., Dag.; Centr. Asia: Mtn. Turkm. **Gen. distr.**: Atl. Eur., Centr. Eur. (S. part), W. and E. Med., Bal.-As. Min. Described from S. Transc.

O. simia Lam. × O. purpurea Huds. — Spike longer and broader than in O. simia, dense, ovoid; hood whitish-pink, conspicuously marked with small dark purple speckles; lip intermediate in shape between O. simia and O. purpurea, with dark purple speckles; apical lobules of the median labellum lobe obtuse or obtusely truncate, to 7 mm long and ca. 1.5–(2) mm broad. — European part: Crimea.

Series 12. **Purpureae** Nevski. — Bracts small, scalelike; hood blackish-purple or conspicuously violet-dotted.

16. **O. purpurea** Huds. Fl. Angl. ed. I (1762) 334; Shmal'g., Fl. II 453, p.pte. — O. fusca Jacq. Fl. Austr. IV (1776) t. 307; Ldb. Fl. Ross. IV, 61, p.pte; Boiss. Fl. Or. V (1884) 65, p.pte. — Ic.: Rchb. Ic. Fl. Germ. XIII–XIV (1851) t. 26. — Exs.: Fl. Austr.-Hung. No. 1476.

Perennial; tubers oblong-ovoid, to 4 cm long; stem 30–80 cm long, above the base to 1.2 cm thick, with 3–6 leaves in lower part, and higher up with a solitary long amplexicaul acuminate foliaceous sheath; leaves approximate, oblong-elliptic or elliptic-lanceolate, obtuse, slightly narrowed toward base, 6–14–(20) cm long, 3–6.5 cm broad; spike densely many-flowered, 5–20 cm long, 4–5.5 cm in diameter; bracts 1.5–3 mm long, ovate, almost translucent; flowers large, vanilla-scented; sepals elliptic-ovate, subobtuse to acuminate, 3-nerved, 9–13 mm long, 4.5–5 mm broad, united into a hood; hood ovate, dotted with blackish-purple or brownish-purple on a pale pink or greenish-white ground, sometimes blackish-purple almost throughout; petals commonly 8–9 mm long and 1–1.5 mm broad, linear, obtuse, narrowed toward base, 1-nerved, contiguous with the margins of the median sepal; lip whitish or light pink with dark purple dots; lateral lobes arising at base, linear, truncate, (6) 7–10 mm long and 1–1.5 mm broad: median lobe large, obcordate, dentate, notched and shortly 2-lobulate, 1–1.5 cm broad; with a tooth to 2 mm long at sinus; apical lobules 4.5–6 mm broad; entire lip 1–1.4 cm long, the distance between the tips of lateral lobes 1.3–1.8 cm; spur 4 mm
695 long, one-third to two-fifths the length of ovary, curved, obtuse. April-May. (Plate XLI, Figure 11).

Mountain woods and forest glades. — European part: Crim. **Gen. distr.**: Atl. Eur., Centr. Eur., W. Med., Bal.-As. Min. (W. part). Described from England. Type in London.

17. **O. maxima** C. Koch in Linnaea XIX (1847) 14. — O. caucasica Rgl. Ind. Sem. Horti Petrop., Suppl. (1869) p. 22. — O. purpurea auct. fl. cauc. (nec Huds.). — O. fusca auct. fl. cauc. (nec Jacq.). — Exs.: Fl. cauc. exs. No. 81.

Perennial; tubers oblong-ovoid, to 4.2 cm long; stem 35–70 cm long,; with 2 whitish membranous sheaths at base, 5 or 6 leaves above them, and higher up 1 (2) amplexicaul acuminate foliaceous sheath; bracts broadly ovate, acuminate, lilac-colored, 2 mm long; flowers large, fragrant; sepals ovate, acuminate, 3-nerved, 0.85–1 cm long and ca. 5 mm broad, forming a purplish-violet-dotted hood; petals linear, shorter than sepals and merely ca. 1 mm broad, obtusish, 1-nerved, suffused at apex and on the margin with pale violet or purplish-violet; lip minutely papillose above, whitish or pale pink with purplish-violet dots; lateral lobes arising at base, linear, obtusely truncate, 7–10 mm long and ca. 1 mm broad; median lobe large, cuneate-obcordate, with a deep sinus between 2 apical lobules; lobules much narrower than in O. purpurea, not more than 2.5–3.5 mm broad and 5–8 mm long, crenulate at apex; tooth at sinus between the lobules 0.5–2 mm long; entire lip 12–17 mm long, the distance between the tips of lateral lobes 11–13 mm, between the tips of lobules of median lobe 9–12 mm; spur whitish, curved, obtuse, 3–5 mm long, one-third to two-fifths the length of ovary. April-May. (Plate XLI, Figure 12).

Mountain woods. — Caucasus: Cisc., Dag., W. and E. Transc. **Gen. distr.**: SE coast of the Black Sea, whence described.

Note. The authentic specimen of O. caucasica Rgl. is missing in the herbarium of the Botanical Institute of the Academy of Sciences and the author has not succeeded in tracking it down. Regel apparently described, under this name, a specimen of the Caucasian race of O. purpurea deviating from the north.

Series 13. Punctulatae Nevski. — Bracts small, much shorter than ovary; hood greenish-yellow, purple-dotted within; lip rather thick.

696 18. **O. punctulata** Stev. ex Lindl. Gen. et Sp. Orch. (1835) 273; Ldb. Fl. Ross. IV, 62; Boiss. Fl. Or. V (1884) 64; p. pte; Shmal'g., Fl. II, 454, p. pte. — O. Steveniana Compère in sched.; Leveillé in Demid. Voy. Russ. Merid. II (1842) 168, nomen.

Perennial; tubers oblong-ovoid or ovoid, 2–3 cm long; stem 25–62 cm long and above the base to 9 mm thick, with 4 or 5 leaves in lower part and above them 1 or 2 acuminate foliaceous sheaths; spike rather loosely many-flowered, cylindric, 7.5–22 (25) cm long, 3–4 cm in diameter; bracts 2–3 (5) mm long, greenish, ovate, acuminate; flowers with a strong vanilla scent; sepals yellowish-green, marked on the inside with small brownish-purple or brownish-lilac dots often nearly confluent into longitudinal lines, oblong-ovate, obtuse, 8–10 mm long, 3.5–4 mm broad; median sepal 3-nerved; lateral sepals inequilateral, commonly 4-nerved; petals linear, 1-nerved, obtuse, shorter than sepals and not more than ca. 1 mm broad; lip yellowish-green or olivaceous; lateral basal lobes linear-oblong, lunately curved, obtuse and somewhat spatulately enlarged, 3–3.75 mm long (along inner margin) and 0.9–1.5 (2) mm broad; median lobe larger, oblong at base, reniformly enlarged and shortly bilobulate at apex, with a linear tooth ca. 1–1.25 mm long at sinus; apical lobules of the median lobe suborbicular or rounded-triangular, longer than or rarely as long as broad (breadth (2) 2.5–3 mm as against length at inner margin 2–2.5 mm); entire lip 6–8 mm long, the distance between the tips of lateral lobes (5.5) 6–8 mm, between the tips of apical lobules 4.5–6.5 mm; spur cylindric, slightly curved, obtuse, (2.5) 3–4 (5) mm long, 1–1.75 mm thick, two-fifths (one-third) the length of ovary. May. (Plate XLI, Figure 14).

Thickets and forest glades. — European part: Crim.; Caucasus: W. Transc. (Tuapse, Novorossiisk, Sochi). Endemic. Described from vicinity of Lapsi (Crimea). Type in Helsinki; cotype in Leningrad and in London.

Note. Flower coloring of this species is wrongly reported by Reichenbach and by Schmalhausen.

O. punctulata Stev. × O. purpurea Huds. (O. Wulffianus Soo in Keller u. Schlechter, Monogr. u. Ic. Orch. Eur. II (1937) 184). — Spike many-flowered, long, with faintly colored bracts; hood roseate-yellow outside, with purple dots and stripes within. Lip much larger than that of O. punctulata, dark bronze-colored; pollinia yellowish-greenish. — European part: Crimea (reported by E. V. Vul'f).

697 19. **O. Schelkownikovii** Woron. in Mitt. Kauk. Mus. IV (1909) 266. — O. sepulchralis Boiss. et Heldr. var. viridiflora Klinge in sched., p. pte; Grossg., Fl. Kavk. I (1928) 263. — Exs.: Herb. fl. cauc. No. 32.

Perennial; tubers oblong-ovoid, to 5 cm long and 2.5 (3 cm thick); stem 45–85 cm long, with 5–7 leaves above the base and higher up with 1 or 2 long amplexicaul acuminate foliaceous sheaths; leaves oblong-obovate to oblong-lanceolate, obtuse, 7–19 cm long and (2.5) 3–5.5 cm broad; spike rather densely many-flowered (50–100 or more flowers), cylindric, 7–26 cm long and 3–4 cm in diameter; bracts broadly ovate, obtuse to

acuminate, whitish-green, 1–4 mm long; flowers with a strong vanilla scent; sepals dingy yellowish-green, with purple often linearly confluent dots within, ovate, obtuse, 8–11 mm long, 4 mm broad, 3- or 4-nerved; petals linear, 1-nerved, obtuse, shorter than sepals and not more than ca. 1 mm broad; lip brown or reddish-brown or dark olivaceous; lateral basal lobes linear-oblong, straight or nearly so, obtuse and scarcely enlarged at apex, (3.75) 4–5 (5.5) mm long at the inner margin and 0.9–1.5 mm broad; median lobe larger, obcordate from a linear-oblong base, bilobulate at apex; lobules oblong, spreading at nearly right angle, round-tipped, 2.5–3 (3.5) mm long at the inner margin and 1.5–2 mm broad; tooth at sinus between the lobules to 1.25 mm broad; entire lip 7–10 mm long, the distance between the tips of lateral lobes 8 mm, between the tips of apical lobules 5.5–6.5 mm; spur cylindric, whitish, scarcely curved, obtuse, 4–6 mm long and 1.25–2.25 mm thick, two-fifths to half the length of ovary; gynostemium lilac-purple. April-May. (Plate XLI, Figure 13).

Thickets. — Caucasus: Cisc., E. Transc., W. Transc. (south of Novorossiisk). Described from village of Akh-su in former Shemakha County. Type in Tiflis; cotype in Leningrad.

Subgenus 2. **DACTYLORHIZA** (Neck.) Nevski. — Neck., Elem. III (1790) 129, pro genere. — Dactylorchis Klinge in A.H.P. XVII (1894) 148.

Lateral sepals spreading; median sepal united with petals into a hood or rarely all sepals galeately united; lip drooping, shortly 3-lobed at apex or entire, minutely papillose above and marked with a more or less conspicuous darker pattern of distinct speckles and lines, broad, spurred at base; spur straight or slightly curved, cylindric or conical; anther ellipsoid, with parallel locules, a process of the rostellum projecting at
698 base between the anther locules; pollinia clavate, with caudicles adherent to 2 glands; glands contained in a common 2-celled bursicule; ovary sessile, twisted; flowers shades of lilac, pink and violet, rarely yellowish; tuberoides palmately lobed, the lobes attenuate and rootlike at the ends; bracts herbaceous, green.

Note. Little is known about hybrids within this subgenus, but there is not doubt that in the USSR hybridization takes place in the case of certain species growing together. Hybrids are also known between the palmately tubered orchids and Gymnadenia conopsea (L.) R. Br., but the author has not come across them in herbarium material from the USSR. As regards hybridization with species of the genus Orchis s.str., they are mentioned in the literature, but their occurrence is not very likely. It would be more correct to consider this subgenus as an independent genus (Dactylorrhiza Neck.) related to the genus Gymnadenia R. Br. rather than to Orchis s. str.

1. Stem with short creeping offshoots at base; all three sepals forming a hood (Section 1. Iberanthus (Schlechter) . . . . . 20. O. iberica M.B.
+ Stem without creeping offshoots at base; lateral sepals spreading sideways. . . . . 2.
2. Tubers cylindric (not compressed), shortly lobed at the ends; flowers yellowish or purple, the lip very slightly yellowish at base (Section 2. Schlechteranthus Nevski). . . . . 3.

+ Tubers laterally compressed (very rarely subterete), more or less long-lobed at the ends, the tips of the lobes long-tapering and root-shaped; flowers without any yellowish shade, rose-lilac, lilac-purple or violet-purple, rarely almost white (Section 3. Klingeanthus Schlechter) . . . . . 5.

3. Spur directed downward. . . . . 23. O. sambucina L.

+ Spur horizontal or more or less turned upward . . . . . 4.

4. Spur 13–20 mm long, twice the length of the lip. . . . . 22. O. romana Seb. et Maur.

+ Spur (6.5) 7–10 mm long, slightly longer than to half as long again as the lip . . . . . 21. O. flavescens C. Koch.

5. Sepals long acuminate and almost aristate; petals about half as long as sepals. . . . . 29. O. aristata Fisch. et Lindl.

+ Sepals not aristate; petals just slightly shorter than the median sepal . . . . . 6.

6. Leaves never spotted . . . . . 7.

+ Leaves spotted above . . . . . 10.

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7. Flowers small, the lip 4.5–5.5 (6) mm long and 5–7 mm broad . . . . . 36. O. latifolia L.

+ Flowers larger, the lip 6–10 (12) mm long and 7–12 (14) mm broad. . 8.

8. Spur cylindric, (10) 12–15 (18) mm long, more or less curved. . . . . 33. O. umbrosa Kar. et Kir.

+ Spur cylindric or conical-cylindric, (7) 9–11.5 mm long, slightly curved or nearly straight. . . . . 9.

9. Spur cylindric, (7) 9–11.5 mm long and 1.8–2.25 mm thick, commonly the length of ovary; lip entire . . . . . 32. O. salina Turcz.

+ Spur conical-cylindric or almost saccate-cylindric, stout, (7) 9–10 mm long and 2.5–3 (3.5) mm thick, two-thirds the length of ovary; lip shortly 3-lobed . . . . . 34. O. sanasunitensis Fleischm.

10. Flowers small; lip entire, (4) 5–5.5 (6) mm long and 5–6 mm broad. . . . . 35. O. cruenta Muell.

+ Flowers larger; lip 3-lobed or rarely entire, (6.5) 7–10 mm long and (7) 8–12 (14) mm broad . . . . . 11.

11. Lip entire, obtusely attenuate; spur saccate-cylindric, shorter than ovary, (6.5) 7–8 (9) mm long and 3–3.5 (4) mm thick . . . . . 28. O. euxina Nevski.

+ Lip 3-lobed, or very rarely entire and then the spur longer and more slender. . . . . 12.

12. Spur cylindric-conical or conical, distinctly tapering to a subobtuse tip, not more than 10 mm long; stems hollow . . . . . 13.

+ Spur cylindric, obtuse; stems solid or nearly solid (with a narrow lumen), or if hollow then spur 12–14 mm long. . . . . 14.

13. Tuber lobes with very long-tapering rootlike tips; leaves commonly folded lengthwise and strongly arched-recurved, rarely straight, linear or linear-lanceolate, the lower 0.5–1.4 cm broad and 6–14 cm long. Plants of peat bogs . . . . . 30. O. Traunsteineri Saut. et Rchb.

+ Tuber lobes with shorter rootlike tips; leaves oblong-lanceolate to lanceolate, spreading, flat, the lower (1.5) 2.2–3.2 cm broad and 6–20 cm long. Plants of wet swampy meadows. . 31. O. baltica Klinge.

14. Spur slightly shorter to longer than ovary, 8–14 mm long and 2.25–3 (3.2) mm thick . . . . . 15.

+ Spur slightly shorter to nearly as long as ovary, 6–8 (9.5) mm long and 1–1.5 mm thick . . . . . 16.

15. Flowers rose-lilac; spur 8–10 mm long and 2.25–2.5 mm thick . . . . . 26. O. amblyoloba Nevski.

+ Flowers violet-purple; spur (11) 12–13 (14) mm long and 2.5–3 (3.2) mm thick . . . . . 27. O. triphylla C. Koch.

16. Lip rounded-rhomboid or broadly rounded-rhomboid in outline, 3-lobed to one-third or one-half the length; median lobe strongly correct, 3–4 (5) mm long and at base 1.5–2.5 mm broad; flowers rose-lilac or rose-violet . . . . . 25. O. Fuchsii Druce.

+ Lip obreniform or rounded-obreniform, shortly 3-lobed at apex; median lobe conspicuously narrower and smaller than the lateral, toothlike, 2–2.5 mm long and at base 2.5–3 mm broad; flowers commonly pale rose-lilac . . . . . 24. O. maculata L.

Section 1. IBERANTHUS Schlechter in Monogr. u. Ic. Orch. Eur. I, 3–4 (1926) p. 160. — All sepals converging to form a hood; stem giving rise at base to short creeping offshoots; tubers not lobed or else 2-parted.

20. O. iberica M.B. ex Willd. Spec. Pl. IV (1806) 25; Ldb. Fl. Ross. IV (1853) 53; Shmal'g., Fl. II, 456. — O. angustifolia M.B. Fl. Taur.-Cauc. II (1808) 368; Boiss. Fl. Or. V (1884) 65. — O. leptophylla C. Koch. in Linnaea XXII (1849) 282. — O. Natolica Fisch. et Mey. Ann. Sc. Nat. (1854) 30. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 154 et 56, fig. III.

Perennial; tubers cylindric-fusiform, gradually tapering at apex, sometimes 2-parted, to 6 mm thick at base; stem forming short offshoots at base, erect, (20) 25–55 cm long, with 2 or 3 lanceolate-linear erect leaves and 1 or 2 linear acuminate upper leaves; lower leaves subobtuse, to 20 cm long and 2 cm broad, though mostly shorter and narrower; spike erect, cylindric, 8–20 cm long and 2.25–3 cm in diameter; bracts narrowly lanceolate, acuminate, about as long as ovary, the upper ones shorter; flowers pale pink, the lip covered with darker purple-rose speckles; sepals ovate-lanceolate or narrowly ovate, acuminate, 3-nerved, 7–9 mm long and 2.5–3 mm broad; median sepal concave and slightly shorter than the lateral sepals; petals narrowly linear-lanceolate, acuminate, 2-nerved, 6 mm long and 1 mm broad; lip obovate-cuneate, minutely papillose above, narrowed toward base, shortly 3-lobed at apex, the lateral; lobes broad and obtuse, the median lobe pointed dentiform; lip 8–11 mm
701 long, 7–7.8 mm broad; spur cylindric, obtuse, curved and slightly enlarged from a narrower base, 5.5–6 mm long and 1–1.25 mm thick. June-July. (Plate XI, Figure 10).

Wet meadows in the upper mountain zone and swampy meadows in river valleys. — European part: Crim.; Caucasus: E. and S. Transc., Cisc. **Gen. distr.**: Bal.-As. Min., E. Med., Iran. Described from Georgia. Type in Leningrad.

Section 2. SCHLECHTERANTHUS Nevski. — Sepals spreading; stem without creeping offshoots; tubers cylindric (not compressed), shortly 2–4-lobed at the end.

21. O. flavescens C. Koch in Linnaea XXII (1849) 281, p. pte; Ldb. Fl. Ross. IV, 56. — O. tenuifolia C. Koch, l.c. p. 281 (forma floribus rubris). — O. romana auct. fl. cauc., non Seb. et Maur. — O. pseudosambucina auct. fl. cauc., non Tenore. — O. georgica Klinge in A.H.P. XVII (1898) 166. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 61, fig. III et t. 62, fig. I et II. — Exs.: Herb. Fl. Cauc. No. 208.

Perennial; tubers shortly 2–4-lobed at the end; stem 10–35 cm long, with 2 membranous obtuse whitish-brown sheaths at base; leaves 5–10 (12), crowded on the lower part of the stem, linear to oblongly linear-lanceolate or rarely oblong-lanceolate, commonly 8–12 cm long and 0.5–1.5 cm broad, obtuse; spike short-cylindric to subovoid, 3–8 cm long and 3–3.5 cm in diameter, densely many-flowered; bracts narrowly lanceolate or lanceolate, the lower exceeding and the upper equaling the flower, subobtuse, the lowest 3–5 cm long and 5.5–7 mm broad; flowers pale yellow or violet-purple, rarely whitish; median sepal elliptic, concave, very obtuse, 6–7 mm long and 3–3.5 mm broad, 3-nerved; lateral sepals elliptic-ovate, also very obtuse and 3-nerved, slightly inequilateral, (6) 7–8.5 (9) mm long and (3) 4–4.5 (5) mm broad; petals ovate, inequilateral, obtuse, 4-nerved, 5–7 mm long and 4 mm broad; lip broadly rounded-oval, shortly 3-lobed at apex; lateral lobes round-tipped, crenulate; median lobe quadrate, often obscurely or distinctly notched at apex; entire lip 5–7 mm long and 7–9 mm broad; spur horizontal or slightly turned upward, obtuse, cylindric, (6.5) 7–10 mm long, slightly longer than to nearly half as long again as the lip. April-May. (June).

Forest glades and thickets in the middle mountain zone. — Caucasus: Cisc., Dag., E., S. and W. Transc. (Artvin district); Tal.; Centr. Asia: Mtn. Turkm. Gen. distr.: Arm.-Kurd., Iran. Described from Transcaucasia. Type in Berlin.

702 22. O. romana Seb. et Maur., Pl. rom. I (1813) 12. — O. pseudosambucina Tenore, Syn. ed. 1 (1815) 72; Ldb. Fl. Ross. IV, 57; p. pte; Boiss. Fl. Or. V (1884) 72, p. pte. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 61, fig. I–II. — Exs.: Fl. cauc. exs. No. 32.

Perennial; tubers 2–4 parted; stem 15–35 cm long, with 2 or 3 obtuse whitish-brown membranous sheaths at base; leaves 4–13 (mostly 5–7), crowded on the lower part of the stem, linear or oblongly linear-lanceolate, 0.4–1.4 cm broad and to 15 (20) cm long, obtuse; spike short-cylindric, looser and fewer-flowered than in D. flavescens (C. Koch), (3) 4–8 cm long and 3–4 cm in diameter; bracts exceeding the flowers, lanceolate or narrowly lanceolate, subobtuse, commonly 2–3 cm long and 3–4 mm broad; flowers yellowish or violet-purple, rarely whitish; median sepal elliptic-ovate, 3-nerved, obtuse, 6–8 mm long and commonly 2.5 mm broad; lateral sepals ovate, obtusish, inequilateral, 7–9 mm long and 3.5–4 mm broad; petals broadly ovate or ovate, 4-nerved, obtuse, strongly asymmetric, 6–8 mm long and to 5 mm broad; lip broadly rounded-ovate, shortly 3-lobate at apex; lateral lobes rounded at the outer margin; median lobe subquadrate, more or less distinctly notched at apex; entire lip 7–9 mm long, 8–12 mm broad; spur horizontal or more or less turned upward, cylindric, obtuse, 13–20 mm long, commonly twice the length of the lip. April-May.

Deciduous and pine woods. — European part: Crim. Gen. distr.: W. Med., E. Med., Bal.-As. Min. Described from Italy.

23. **O. sambucina** L., Fl. Suec. ed. 2 (1755) 312; Ldb. Fl. Ross. IV, 55, p. pte. — O. incarnata L. Fl. Suec. ed. 2 (1755) 312; Willd. Sp. Pl. IV (1806) 30 (f. floribus purpureis). — O. lutea Dulac. Fl. Haut. Pyren. (1868) 125. — Ic.: Fl. Dan. t. 1232 et 2737; M. Schulze, Orch. Deutschl. (1894) t. 22. — Exs.: HFR no. 941.

Perennial; tubers cylindric, not compressed, commonly 2-parted at the end; stem 10–30 cm long; leaves 4 or 5, on lower part of the stem, lanceolate to oblong-lanceolate, obtuse, 1–2 (2.5) cm broad and 5–10 cm long; spike short-cylindric, densely many-flowered, to 6 cm long and 3–4 (4.5) cm in diameter; bracts linear-lanceolate or narrowly lanceolate, subobtuse, equaling or exceeding the flower; flowers yellowish with few purple speckles on the lip or purple throughout, with a faint scent reminiscent of Sambucus nigra flowers; sepals oblong-ovate, obtusish, 3-nerved, the median 7–8 mm long, the lateral 8–9 mm long and 4 mm broad; petals ovate, very asymmetric, slightly shorter than the median
703 sepal; lip rounded-rhomboid to suborbicular, shortly or obscurely 3-lobed at apex; lateral lobes rounded and crenulate at the outer margin or almost entire, semirhomboid, obtuse; median lobe ovate-triangular or subquadrate, obtuse or obtusish; entire lip 7–8 mm long, 7–9 mm broad; spur turned downward, stout, cylindric, obtusish, sometimes scarcely curved, 10–12 (15) mm long. May-June.

Thickets and deciduous woods. — European part: U. Dnp., M. Dnp. **Gen. distr.**: Scand., Atl. Eur., Centr. Eur., W. Med., Bal.-As. Min. (W. part). Described from the surroundings of Stockholm. Type in London.

Section 3. KLINGEANTHUS Schlechter in Monogr. u. Ic. Orch. Eur. I 3–4 (1926) p. 160. — Lateral sepals spreading; stem without creeping offshoots; tubers compressed, the lobes long-tapering and rootlike.

24. **O. maculata** L. Sp. Pl. ed. 1 (1753) 942. — O. elodes Griseb., Ueber die Bildung des Torfs in der Emsmooren (1846) 25, in adnot. — O. ericetorum Linton, Fl. Bournm. (1900) 208. — O. basilla L. Oel. et Gothl. Resa (1745) 48, p. pte. — Ic.: Fl. Dan. VI (1787) tab. 933; M. Schulze, Orch. Deutschl. (1894) tab. 23 (excl. fig. 3–5).

Perennial; stem firm, 25–50 cm long and at base 3.5–8 mm thick; leaves (2) 5–6 (8) spotted, spreading or arched-recurved, nearly flat or slightly conduplicate, subobtuse or acuminate; lowest leaf 5–10 cm long and 0.8–3 cm broad, oblong-lanceolate to lanceolate, obtuse or subobtuse; next 2 leaves oblong-lanceolate, acuminate, 6–15 cm long and commonly 1–2 cm broad; uppermost leaves linear or subulate-linear, often slightly flexuous, acuminate, 2–9 mm long and 2–5 mm broad, not reaching the spike base; spike ovoid-cylindric, densely many-flowered, 3–9 cm long and 2.9–3.9 cm in diameter; bracts narrowly linear, lanceolate, acuminate, shorter than or the lowest sometimes slightly exceeding the flower, 2–2.5 cm long, the upper commonly 4–7 mm long; flowers pale rose-lilac; lip with small violet speckles, these arranged in bulging longitudinal discontinuous rows or partially confluent into short lines; sepals lanceolate or broadly lanceolate, about as long as the median sepal, lanceolate, inequilateral; lip obreniform or rounded-obreniform, (7) 8–10 mm long and (9) 10–12 (14) mm broad, shortly 3-lobed at apex; median lobe much

smaller and narrower than the lateral, dentiform, broadly triangular, obtusish, 2–2.5 mm long and at base 2.5–3 mm broad, shorter than the
704 lateral lobes or scarcely noticeable beside them; lateral lobes rounded and crenulate-denticulate at the outer margin; spur cylindric, straight, obtuse, slightly shorter than to about the length of ovary, 6–8 (9.5) mm long and 1–1.5 mm thick. July. (Plate XLII, Figure 2).

Swampy woods and their margins. — European part: Kar.-Lap., Dv.-Pech. (W. part), Lad.-Ilm., U. V. (former Tver Province), U. Dnp. Gen. distr.: Scand., Atl. Eur., Centr. Eur. (N. part). Described from N. Europe. Type in London.

25. O. **Fuchsii** Druce, Rep. Bot. Exch. Cl. Brit. Isles IV (1914) 105. — O. maculata Ldb. Fl. Ross. IV (1853), prom max. pte; Shmal'g., Fl. II, 457, pro max. pte; Kryl., Fl. Zap. Sib III, 688. — Ic.; T. et T. A. Stephenson in Journ. of Bot. LVIII (1920) t. 556, fig. 21 et 22. — Exs.: HFR No. 290; Hayek Fl. stir. 324; Fl. Hung. (Herb. Mus. Nat. Hung. Bud.) no. 87.

Perennial; tubers 2–4-lobed, compressed; stem (15) 25–65 cm long and at base to 7 mm thick, solid or scarcely hollow; leaves commonly 6 (4–8), dark green with violet-brown spots above, plain glaucescent-green beneath, spreading, flat; lowest leaf obovate or oblong-obovate or oblong-lanceolate, obtusely round-tipped, 4–12 cm long and (1.5) 2–4.5 cm broad; next 2 leaves oblong-lanceolate or rarely oblong-obovate, obtuse or subobtuse, 6–15 cm long and 0.8–3.5 cm broad; uppermost leaves narrowly linear-lanceolate, acuminate, erect, bractlike, far from reaching the spike base; spike cylindric, dense, though looser and more slender than that of D. maculata, (3) 4–14 cm long and (2.2) 2.5–3 cm broad; bracts linear-lanceolate, acuminate, all shorter than the flower, commonly 6–12 mm long, very rarely the lowest exceeding the flower and up to 2.5 cm (or slightly more) long; flowers pinkish lilac-violet; lip with a very well defined violet pattern of speckles, these more or less confluent into thickish, interrupted, somewhat outward-bulging longitudinal lines; sepals lanceolate or broadly lanceolate, obtusish; lateral sepals 6.5–9 mm long and to 3 mm broad, sometimes with scattered darker speckles; median sepal barely exceeding the petals, 6–8 mm long; lip rounded-rhomboid in outline, 7–9 (10) mm long and 9–10 (12) mm broad, 3-lobed for one-third to one-half the length; median lobe porrect, oblong-ovate or oblongly
707 ovate-triangular, obtusely attenuate or acuminate or obtusish, 3–4 (5) mm long and at base 1.5–2.5 mm broad; lateral lobes rhomboid, slightly broader than the median lobe, obtusish, crenate and obtusely dentate on the outer margin; spur cylindric, straight, 6–8 mm long and 1–1.5 mm thick, slightly shorter than ovary. June-Mid July. (Plate XLII, Figure 1, a).

Glades, wood margins, and thickets. — European part: Dv.-Pech., Lad.-Ilm., U. V., V.-Ka., V.-Don, U. Dnp., M. Dnp., L. Don, Transv.; W. Siberia: Ob, U. Tob., Irt., Alt., Yen.; E. Siberia: Ang.-Say., Dau., Lena-Kol. **Gen. distr.**: Atl. Eur., Scand., Centr. Eur., N. Mong. Described from England.

Note. O. maculata and O. Fuchsii differ not only morphologically but also in habitat conditions and in time of flowering. O. maculata is associated with damp mossy woods and with their margins and glades, and is accompanied rather extensively by sphagnum mosses. O. Fuchsii

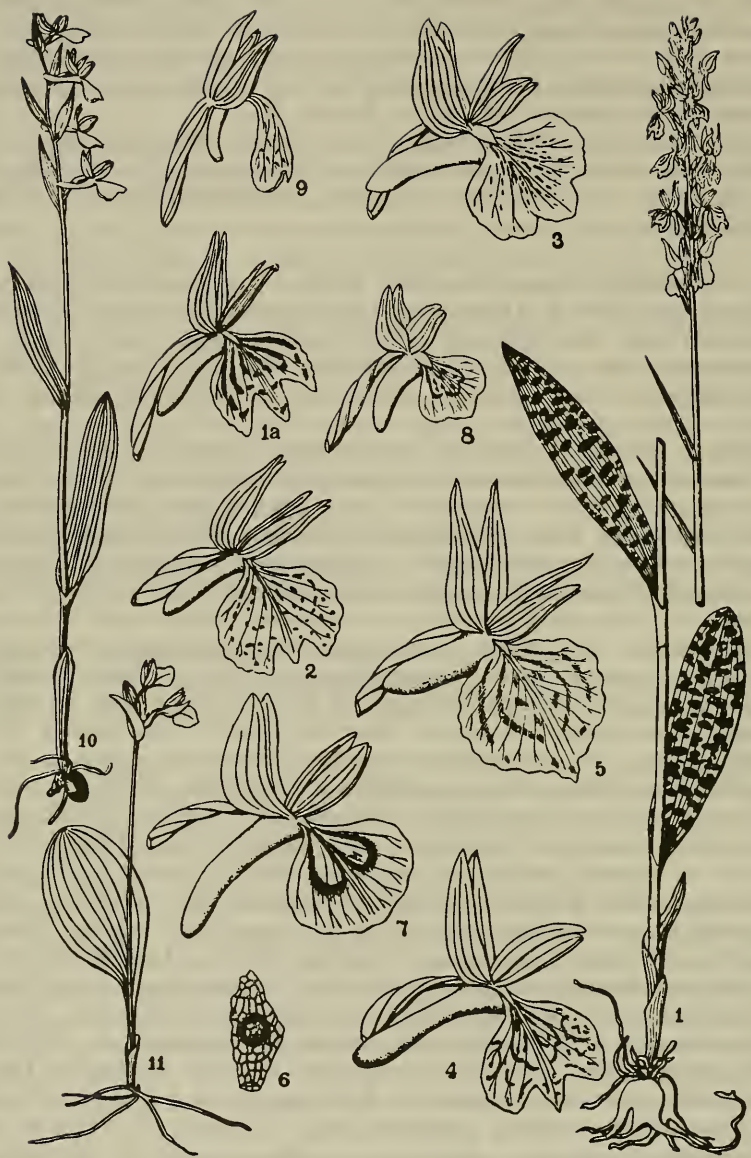

Plate XLII

1. Orchis Fuchsii Druce, 1a) flower.– 2. O. maculata L., flower.– 3. O. amblyoloba Nevski, flower.– 4. O. triphylla C.Koch., flower.– 5. O. euxina Nevski, flower.– 6. O. majalis Rchb. f., seed.– 7. O. umbrosa Kar. et Kir., flower.– 8. O. latifolia L., flower.– 9. O. iberica M.B. ex Willd., flower.– 10. Chusua secunda Nevski.– 11. Galeorchis cyclocheila (Fr. et Sav.) Nevski.

is a meadow-forest species, common in shrub thickets and at the margin of woods, and is confined to places where Sphagnum species do not grow. At the time O. maculata is just beginning to flower, the flowering of O. Fuchsii is coming to an end or at least close to that condition. In geobotanical investigations in the forest zone of the USSR, care should be taken to ensure distinction between these two species. *

26. **O. amblyoloba** Nevski sp. nova in Addenda III, p. 753. — Orchis maculatus auct. fl. cauc. pro parte, non L. — O. Carthaliniae Klinge in A.H.P. XVII 1 (1898) 196, pro min. parte; Grossh., Fl. Kavk. I (1928) 268, pro parte. — Exs.: Pl. or. exs. No. 331.

Perennial; tubers 2–4-lobed, the lobes tapering into cordlike tips; stem nearly solid, with a narrow lumen, erect, 25–55 (60) cm long and above the base 3–5 (7–9) mm thick; leaves 3–5 (8), spreading, spotted; lowest leaf oblong-lanceolate to oblong-obovate, rounded-obtuse to subobtuse, 7–12 (15) cm long and 1.2) 1.5–2.5 (3.5) cm broad; narrowed toward subobtuse, 9–15 cm long and 1–2 (2.5) cm broad; uppermost leaves (1 or 2) bractlike, narrowly linear-lanceolate, acuminate, 2.5–7 cm long and (1.5) 2–5 (7) mm broad; spike cylindric, densely many-flowered, 5–14 (17) cm long and 2.5–3.5 cm in diameter; middle and upper bracts shorter than the flower, 0.9–1.5 cm long and 2–2.5 mm broad, narrowly lanceolate, acuminate; lowest bracts commonly half as long again as the flower,
708 narrowly lanceolate or linear-lanceolate, 2.2–3 cm long and 2.5–3.5 (4) mm broad; flowers rose-lilac; lip marked at base with well defined very small round or elongated speckles and dots, these mostly disposed in interrupted divergent longitudinal lines; median sepal oblong-elliptic, obtuse, concave, (6) 7–8 mm long and ca. 3 mm broad, 3-nerved; lateral sepals ovate-lanceolate or ovate, inequilateral, 3- or 4-nerved, obtusish or obtuse, 8–10 mm long and 3–4 mm broad; petals ovate, slightly shorter than the median sepal, obtuse; lip minutely papillose above, broadly rounded-rhomboid or transversely,rhomboid or transversely rounded-elliptic, 7–8 mm long and 8.5–10 (12) mm broad; median lobe broadly ovate, obtuse or round-tipped, 3–3.5 mm long and 2.5–3 (3.25) mm broad; lateral lobes more or less crenate and obtusely dentate, subrhomboidal, obtuse, shorter than the median lobe; spur straight, cylindric, obtuse, slightly shorter than to as long as ovary, 8–10 mm long and 2.25–2.5 mm thick. June-July (August). (Plate XLII, Figure 3).

Mountain woods in the middle and lower mountain zones. — Caucasus: E. Transc. (W. part: vicinity of Borzhomi — Libani, Bakuriani; vicinity of Tiflis; Fes-Feten), W. Transc. (at the E. border of the region; Kudarskii District). Endemic. (Described from Bakuriani. Type in Leningrad.

27. **O. triphylla** C. Koch in Linnaea XXII (1849) 283. — O. affinis C. Koch. l.c. p. 284. — O. lancibracteata C. Koch l.c. p. 284. — O. Carthaliniae Klinge in A.H.P. XVII (1898) 196, pro maxim. parte. — O. lancibracteus Grossh., Fl. Kavk. I (1928) 269. — O. maculatus L. ssp. lancibracteatus Soo, Rep. (1927) 32. — O. maculata L. var. Brotheri Somm. et Lev., Enum. Pl. Cauc. in A.H.P. XVI (1900) 419. —

* The author has recently become convinced that this USSR plant which he is treating as O. Fuchsii, is in fact a new species of O. saccifera Brogn. and O. amblyoloba m. affiliation. He will, however, be unable to settle this problem finally before receiving herbarium and live material relating to the British O. Fuchsii s. str.

O. pontica Fleischm. et Hand.-Maz., Ann. Hofmus, Wien. XXIII (1909) 208. — O. saccifera Kränzl. in Fedde Repert, Beih. LXV, (1931) 43, pro parte, non Brogn.

Perennial; tubers 2–4-lobed, with rootlike tips; stem 25–35 cm long; above the base, 3–9 mm thick; hollow but strong-walled; leaves 3–6 (8), spreading, spotted; lowest leaf broadly lanceolate or oblong-lanceolate, obtuse or subobtuse, 4–9 cm long and 1.5–3.8 cm broad, the breadth to length ratio 1:2.3–1:3.6 (1:5); middle leaves oblong-lanceolate or lanceolate, subobtuse, 6–13 cm long and 1.2–3.2 cm broad; uppermost leaves bractlike, narrowly linear, acuminate, ca. 0.4–0.8 cm broad; spike cylindric or short-cylindric, 4–13 cm long and 2.5–3.5 (4) cm in diameter, densely many-flowered; bracts narrowly lanceolate, acuminate; lower bracts spreading, greatly exceeding or rarely just slightly exceeding the flower, 2–4 cm long and 3–5 mm broad; upper bracts much shorter, commonly equaling the flower, 1–1.9 (2) cm long and 2–3 mm broad; flowers violet-purple or reddish-violet-purple [magenta?]; lip with a pattern not very pronounced against the ground color and consisting of interrupted or sometimes
709 continuous lines and distinct speckles, the lateral perianth segments also commonly dark-speckled; median sepal ovate-lanceolate, 8–10 mm long and ca. 3–3.5 mm broad, subobtuse; lateral sepals also ovate-lanceolate and subobtuse, inequilateral, commonly 5-nerved, 9–12 mm long; petals broadly lanceolate, commonly 8 mm long and ca. 2.5 mm broad; lip minutely papillose above, obreniform or rarely broadly rounded-cordate, 8.5–10 mm long and 11–14 mm broad, 3-lobed at apex; median lobe triangular-ovate or often triangular, subobtuse or acuminate, commonly 3–5 mm long and at base 2.5–3 mm broad; lateral lobes subrhomboid, crenate-dentate on the outer margin, obtuse, broad, shorter than the median lobe; spur cylindric, obtuse, straight, equaling or slightly exceeding the ovary, (11) 12–13 (14) mm long and 2.5–3 (3.2) mm thick, the color of perianth segments or paler. (June) July-August. (Plate XLII, Figure 4).

Subalpine mountain meadows. — Caucasus: Cisc., E., S. and W. Transc.: Gen. distr.: Arm.-Kurd., Bal.-As. Min. (E. part of Asia Minor), Iran. Described from Lazistan. Type in Berlin,

Note. In addition to typical specimens, one comes across two other forms which, upon future study of live material, may possibly have to be established as independent species: 1) f. longicuspis Nevski, with a long and narrow linear and sometimes recurved median tooth of the labellum, which reaches on the average 4–5 (6) mm in length, and lanceolate long-acuminate sepals (9) 10–13 mm long (Abkhazia); 2) f. hologlottis Nevski, with an entire or nearly entire rounded-cordate labellum (= O. turkestanica Schlechter in Schlechter u. Keller. Monogr. u. Ic. Orch. Eur. I, 5–6 (1927) 173 p.pt. ?. non Klinge). (Cisc.).

28. O. **euxina** Nevski nom. nov. — O. cordigera Kränzl. in Fedde, Repert. Beih. LXV (1931) 39, non Fries. — O. cordigera var. caucasica Klinge ex Lipsky Fl. Cauc. impr. Colch. novit. (1898) 306. — O. monticola Klinge ssp. caucasica Klinge in A.H.P. XVII (1898) 181. — O. caucasicus Soo, Berlin. Notizbl. (1926) 909, non Regel in Ind. Sem. Hort. Petrop. (1869) 22. — O. caucasica Schlechter in Keller et Schlechter Monogr. u. Ic. Orch. Eur. I, 5–6 (1927) 173, non Rgl. — O. caucasicus Soo var. Markowitschii Soo, Rev. Orch. Südosteur.

u. Südwestas. (1928) 73. — Ic.: Schlechter, l.c., tab. 16, fig. 61. — Exs.: Woronow Fl. Cauc. No. 320.

Perennial; stem 10–25 (30–35) cm long; leaves (3) 4 or 5, spotted; lower leaves elliptic-lanceolate or oblongly elliptic-lanceolate, obtuse, slightly narrowed toward base, spreading, (2) 3–7 cm long and (1) 1.5–2.2 (3) cm broad (breadth to length ratio 1:2–1:3); upper leaves subobtuse and narrower; spike short-cylindric to subovoid, dense, 2.5–5 cm long and
710 2–3 (3.5) cm in diameter; lower bracts exceeding, the upper equaling or shorter than the flower, green or more or less violet-tinged, lanceolate or narrowly lanceolate, short-acuminate; middle bracts 1.5–2 cm long and 4–5.5 mm broad; flowers dark violet-purple; lip with an even darker pattern, not very pronounced against the ground color and consisting of speckles more or less confluent in rounded longitudinal lines; sepals narrowly ovate-lanceolate, obtusish, 3–5-nerved, the median (7.5) 8–9 mm long and 3–3.5 mm broad, the lateral inequilateral 9–10 mm long and 3–4 mm broad; petals asymmetrically lanceolate, barely shorter than the middle sepal; lip entire, more or less crenate-dentate, rounded rhomboid-ovate or broadly rounded-ovate, broadest at base, (7) 8–9 (10) mm long and 10–12 (14) mm broad, subobtuse or obtuse; spur saccate-cylindric to subconical, short and stout, shorter than and sometimes only half as long as ovary, (6.5) 7–8 (9) cm long and 3–3.5 (4) mm thick. June-July. (Plate XLII, Figure 5).

Alpine and subalpine high-mountain meadows. — Caucasus: Cisc. (Greater Caucasus), Dag. (N. part), W. Transc. Gen. distr.: Turkish Armenia. Described from vicinity of city of Ordzhonikidze. Type in Leningrad.

29. **O. aristata** Fisch. ex Lindl. Gen. et Sp. Orch. (1835) 262; Kom., Fl. penins. Kamtsch. I (1927) 311. — O. latifolia var. Beeringiana Cham. in Linnaea III (1828) 26. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1751) t. 58.

Perennial; tubers 2–5-parted; the attenuate rootlike lobes again 2-parted; stem (10) 20–40 cm long, hollow and rather slender; leaves (2) 3 or 4 (7), spotted or spotless, obovate (the lower), oblong-obovate or oblong-lanceolate, obtuse, narrowed toward base, the 2 lowest commonly 4.5–12 (16) cm long and (1.8) 2–3.5 (4) cm broad, spreading, the upper small acuminate lanceolate; spike short-cylindric, (2) 4–10 (14) cm long and 3–4 (4.5) cm in diameter; bracts broadly lanceolate, green or more or less violet-tinged, acuminate, the lower slightly exceeding the flower (1.8) 2–3 cm long and 4–7 (7.5) mm broad, the upper shorter than the flower, sometimes subobtuse, slender-pointed, 1–1.5 cm long and 3–4.5 mm broad; flowers violet-purple; lip obscurely patterned at base; sepals sometimes with darker speckles, lanceolate or narrowly lanceolate, slenderly long-acuminate to subaristate; lateral sepals 9–15 mm long and at base 3–4.5 mm broad; median sepal 8–13 mm long and 3–4 mm broad; petals much shorter than sepals (about half the length), 5–7 mm long and 2–4 mm broad, ovate-lanceolate, acuminate; lip densely and minutely papillose above, 6–9 (10) mm long and 7–10 (11) mm broad, rounded-
711 obovate, subentire or shortly 3-lobed at apex, the dentiform median lobe pointed; spur (9) 10–14 (16) mm long and 2.25–2.5 mm thick, horizontal or slightly turned upward. June-July.

Forest glades.— Far East: Kamch., Sakh., Okh. Gen. distr.: N. Am., Ber., Jap.-Ch. (Japan, Korea). Described from Unalaska. Type in Leningrad.

30. **O. Traunsteiner** Saut. ex Rchb. f. Fl. Germ. Exs. (1830) 140; Shmal'g., Fl. II, 458.— O. angustifolia Lois. ex Rchb. Pl. crit. IX (1831) 17.— O. curvifolia Nylander. Spicil. Pl. Fennic. II (1843) 11; Fries Summa Veg. Scand. I (1846) 217; Ldb. Fl. Ross. IV (1859) 55; Meinshausen Fl. Ingr. (1878) 337.— O. angustifolia var. Russovii Klinge, Revis. O. cordig. et O. angust. (1893) 84.— O. angustifolia Rchb. ssp. Russovii Klinge in A.H.P. XVII (1898) 177.— O. Russovii Klinge l.c. sub. tab. I-II.— O. lapponica Laestadius ex Rchb. f. Ic. Fl. Germ. XIII-XIV (1851) 97.— O. maculata var. lapponica Nyl. et Sael. Herb. Mus. Fenn. (1859) 20.— O. Traunsteineri var. lapponica Hartm. ex Rchb. f. l.c. p. 37.— Ic.: Klinge l.c. (A.H.P.) t.I, II.— Exs.: Dörfler. Herb. Norm. No. 4379.

Perennial; tubers 2- or 3-lobed, the lobes long, long-tapering and rootlike at the ends; stem 20–35 (50) cm long, hollow, erect or slightly flexuous; leaves 3–5, spotted, commonly conduplicate and strongly arched-recurved, rarely straight or nearly so, linear to linear-lanceolate, subobtuse or acuminate; lowest leaves 6–14 cm long and 0.5–1.4 cm broad (the breadth to length ratio (1:7) 1:12–1:20), broadest above the middle or rarely nearer base; spike short-cylindric to subovoid, rather dense, 3–6 (9) cm long and 2.7–3.5 cm in diameter; bracts lanceolate to linear-lanceolate, the lower slightly exceeding or equaling and the upper shorter than the flower; flowers violet-purple or purple; lip with a darker rhomboid-obovate violet pattern composed of somewhat-interrupted lines; sepals lanceolate, subobtuse, 3- or 4-nerved; lateral sepals inequilateral, (7.5) 8–11 mm long and at base 2 5–4 mm broad; median sepal (6.5) 7–9 mm long and 2.5–3 (3.5) mm broad, mitrate at apex; petals 5.5–8 mm long and 2–3.5 mm broad, subobtuse; lip minutely papillose above, broadly rounded-rhomboid or rounded-obovate 7–10 mm long and 8–11 (12) mm broad, shortly 3-lobed at apex (rarely almost entire); median lobe ovate-triangular or triangular, subobtuse, 2–3.25 (4) mm long and at base 2.5–3 mm broad; lateral lobes semiorbicular-rhomboid, obtuse, the margin crenulate; spur cylindric-conical, straight, slightly attenuate toward the end but obtuse, 7–10 mm long and 2–2.5 (3) mm thick. June-July.

Peat bogs.— European part: Kar.-Lap., Arc. Eur., Lad.-Ilm., Dv.-
712 Pech., U.V., V.-Dnp., V.-Ka. (N. part), M. Dnp. (Zhitomir); W. Siberia: Ob. Gen. distr.: Scand., Centr. Eur. Described from the Tyrol.

Note. In opposition to Schlechter, who separates USSR plants from the Central European under the name Orchis Russovii Klinge, it must be noted that there are no serious grounds for this approach. The sole noticeable difference consists in the leaves of northern USSR plants being strongly arched-recurved, but specimens from the Baltic States and the Western Region* already have straight or nearly straight leaves. As regards differences in flower structure indicated by Klinge and Schlechter, they are in fact nonexistent, and one is obliged to dismiss the length of spur, as proposed by Schlechter, or the labellum shape, according to

* [Since 1937 Smolensk and Orel regions.]

Klinge, as distinguishing characters. Even if leaf curvature were to be considered an important enough character to justify the setting up of a distinct species as a counterpart to straight-leaved O. Traunsteineri s. str., such a species should by right be named O. curvifolia Nyl. and not O. Russovii. O. lapponica Laest. is an arctic form of O. Traunsteineri, distinguished by its short leaves, 3–5 cm in length, more obtuse median labellum lobe, and the spur being 4–8 mm long.

31. **O. baltica** Klinge in A.H.P. XVII (1898) 170, p. max. pte.— O. latifolia Ldb. Fl. Ross. IV, 54, p.p.— O. latifolia var. junialis Vermeulen in Ned. Kruidk. Archief. (1933) 397; Journ. Bot. LXXII (1934) 97.— O. pardalina Pugsley in Journ. Linn. Soc. XLIX (1935) 533.— Ic.: Jour. Bot. l.c. pl. 556, ff. 13, 14, 16.

Perennial; tubers 3–5 parted , the ends of the lobes attenuate and rootlike; stem hollow, erect, (20) 30–60 cm long, at base 8–10 mm thick; leaves (4) (4) 5 or 6, oblong-lanceolate to lanceolate, subobtuse or acuminate, slightly narrowed toward base, marked with rather small spots; lower leaves (6) 9–20 cm long and (1.5) 2–3.2 (3.7) cm broad (the breadth to length ratio 1:3–1:8); uppermost leaves reaching the base of inflorescence, small and narrow, acuminate; spike short-cylindric to ovoid, 3–9.5 cm long and (2.4) 2.5–3 (3.5) cm in diameter, densely many-flowered; bracts narrowly lanceolate or lanceolate, subobtuse, the lower bracts exceeding the flower, 2–3 (3.5) cm long and (2.5) 3–5.25 mm broad, the upper commonly about equaling the flower; flowers violet-purple, the lip speckled with dark violet; sepals ovate-lanceolate, 3-nerved, obtuse or obtusish; median sepal concave, 7–9 mm long; lateral sepals inequilateral, 3–10 mm long and 3–4 mm broad, commonly marked with darker speckles; petals obtuse, subovate, inequilateral, slightly shorter than the median sepal; lip transversely rounded-elliptic or rounded-rhomboid in outline, 3-lobed, minutely papillose above, 7–8.5 (9) mm long, (8) 9–10 (12) mm broad; median lobe ovate-triangular, obtuse, round-tipped, 2.5–3,5 mm long and at base 2.5–2.8 (3) mm broad, slightly projecting in relation to the lateral
713 lobes, these almost semiorbicular, obtuse, with rounded crenulate outer margin; spur cylindric-conical, obtuse or obtusish, turned downward, (7) 7.5–9 mm long and 2–2.75 (3) mm thick. June-July.

Wet meadows.— European part: Lad.-Ilm. (W. part, area of Pskov, Narva and Pavlovsk), Dv.-Pech. (Pechora Territory, Ust-Tsil'ma); W. Siberia: Irt., Ob. (Chulym River basin), Yen., Ang.-Say. (NW part). **Gen. distr.**: Atl. Eur., Scand. Described from the Baltic States. Type in Leningrad.

Note. The distribution of O. baltica in the USSR is most interesting. After the Baltic concentration, there is an enormous disruption, probably to be accounted for by one of the glaciation periods, and then the species reappears in the northern part of the Ural area (Pechora Territory, collection of R. Pole), and then again west of the Yenisei and the former Semipalatinsk Region (Kandygataiskie Mountains). It is impossible to distinguish the Yenisei and Semipalatinsk specimens from the Baltic. It is difficult to explain how L. Sergievskaya, who devoted a special study to the distribution of O. incarnata auct. and O. latifolia auct., non L. in W. Siberia (in Animadv. Syst. ex Herb. Univ. Tomsk. (1929) 1), arrived at the conclusion that only O. incarnata occurs in Siberia;

and that in spite of the fact that Orchis baltica (= Dactylorhiza baltica m.) had been gathered by many collectors in the former Yenisei Province (N. part) and Semipalatinsk Region. The dimension recorded by Sergievskaya for the labellum of W. Siberian specimens of "O. incarnata" (4–7 and 5–8 mm) arouse the suspicion that some kind of error may have occurred here, as the author does not know of any O. incarnata auct., non L. plants with labellum more than 5.5–(6) mm long. The author is also unable to figure out the precise connotation of O. incarnata v. intermedia as described by Sergievskaya. As regards the appellation of O. incarnata auct., non L., this plant, according to H. W. Pugsley ("On Some Marsh Orchids" in Journ. Linn. Soc. XLIX (1935) 553), should be named O. latifolia L., since Linnaeus had applied this name to the very plant that in due course became to be known under the epithet "incarnata". O. incarnata L. is in fact a red-colored O. sambucina L.

32. **O. salina** Turcz. ex Lindl. Gen. et Sp. Orch. (1835) 259; Ldb. Fl. Ross. IV, 83; Turcz. Fl. baic.-dah. II, 177; Kom. Fl. Mansh. I (1901) 509. — O. latifolia L. var. salina Trautv. Cat. pl. a Lomonossovio in Mong. Or. lect. (1871) 92. — O. orientalis Klinge ssp. O. salina Klinge in A. H. P. XVII (1898) 185, ex parte. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 43, fig. II.

Perennial; tubers (2) 3–5-parted; stem (10) 15–25 (30) cm long, hollow, rather stout; leaves (4) 5- or 6, never spotted, linear-lanceolate or narrowly lanceolate, acuminate, more or less arched-recurved or spreading; lower leaves commonly 4–10 cm long and (0.8) 1–2.2 cm broad, slightly narrowed toward base; upper leaves narrower and more pointed, the uppermost bractlike and reaching the base of spike; spike short-cylindric, densely many-flowered, 3–12 cm long and (2) 2.5–3 (4) cm in
714 diameter; bracts green or more or less violet-tinged, narrowly lanceolate to lanceolate, acuminate; lower leaves commonly equaling or exceeding the flower, 1.75–3 cm long and 3–4 (5) mm broad; upper leaves shorter than flower, 1–1.5 cm long and 3–4 mm broad; flowers violet-purple; lip marked at base with a pattern consisting of a continuous line shaped liked the Greek letter ω, the area enclosed by this line whitish due to a dense cover of minute papillae, the remaining surface violet-purple; sepals ovate-lanceolate, obtuse or obtusish; lateral sepals inequilateral, 7.5–9.5 mm long and 3–3.75 (4) mm broad, 3-nerved; median sepal 6.5–9 mm long; petals ovate-lanceolate to subovate, about the length of the median sepal and ca. 3 mm broad, obtuse; lip broadly rounded-ovate to suborbicular, obtuse or subobtuse, entire or very rarely obscurely 3-lobed, broadest above the middle (i.e., nearer the base), (6) 7–9 mm long and 7–10 mm broad; spur cylindric, slightly attenuate and somewhat recurved toward apex or nearly straight, (7–9) 9–11.5 mm long and 1.8–2.25 mm thick, always slightly longer than the lip and usually the length of ovary. June-July.

Meadows, mostly somewhat saline. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Far East: Ze.-Bu. Gen. distr.: Dzu.-Kash. (NE part), Mong., Tibet. Described from Dauria. Type in Kharkov; cotype in Leningrad.

33. **C. umbrosa** Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 504. — O. orientalis Klinge ssp. O. turkestanica Klinge in A. H. P. XVII

(1895) 183. — O. turkestanica Klinge ap. Fedtschenko, Journ. Bot. Russ. (1908) 191. — O. incarnata L. var. Knorringiana Kränzl. in Fedde, Repert. Beih. LXV (1931) 34. — O. salina Kränzl. l.c. p. 35, ex parte, non Turcz. — Exs.: H.F.A.M. No. 349.

Perennial; tubers 3–6-parted; stem (10) 30–50 (80) cm long, hollow, erect, stout, at base to 1.5 cm thick; leaves 4–12 (mostly 6 or 7), never spotted, lanceolate to linear-lanceolate, acuminate, slightly spreading or more or less recurved; lower leaves (7) 10–30 cm long and 2–5 cm broad, very slightly narrowed toward base; upper leaves narrower, usually reaching the base of spike; spike cylindric or short-cylindric, densely many-flowered, 3–25 cm in diameter; bracts green or violet-tinged, narrowly lanceolate, acuminate, more or less spreading; lower bracts commonly equaling or more or less exceeding the flower, 2.5–4 mm long and 3–4.5 mm broad, the upper 1.2–1.8 cm long and 2.5–3 mm broad; flowers violet-purple or lilac-purple; lip at base faintly whitish, with a violet pattern consisting of a continuous line shaped like the Greek letter ω and a fine hachure inside the line, the remaining surface also dark-speckled;
715 lateral sepals ovate-lanceolate, obtusish, (8) 9–11 (13) mm long and 3–3.5 (4) mm broad, inequilateral; median sepal 7–9 (10–11) mm long and 2.5–3.5 mm broad, obtuse; petals about the length of the median sepal; lip minutely papillose above, rounded-rhomboid or rounded-obcordate, rarely rounded-cordate or suborbicular, very obscurely 3-lobed at apex or with a small obtuse median tooth, very rarely shortly 3-lobed, (7) 8–10 (12) mm long and (7) 8–12 (14) mm broad, narrowed toward base and broadest below the middle (i.e., nearer apex); spur cylindric, more or less curved, obtusish or obtuse, (10) 12–15 (18) mm long and 1.5–2.25 mm thick, always longer than the lip and mostly the length of ovary. May-June. (Plate XLII, Figure 7).

Wet mountain meadows. — Centr. Asia: Dzu.-Tarb., T.Sh., Syr D., Pam.-Al.; W. Siberia: Alt. (only the southernmost part: Kal'dzhir and Arda river valleys), U. Tob. (Naurzum-Karagai pine forest). Gen. distr.: Dzu.-Kash., Ind.-Him. (Hindu Kush). Described from osier bed on islands of the Lepsa River. Cotype in Leningrad; type in Moscow (?).

Note. The plant listed in the Herbarium of Central Asian Flora under No. 349, differs from the type in its shorter spurs and a somewhat different labellum coloring. Of particular interest is the location of this species in the former Tugai Region, without any connection with the main distribution area.

34. O. sanasunitensis Fleischm. in Annal. Hofmus. Wien, XXVIII (1914) 35. — O. holocheilos Soó var. sanasunitensis Soó in Rev. Orch. Südosteur. u. Südwestas. (1928) 73. — O. incarnata (+ O. baltica) var. Raddeana Klinge in herb. — O. incarnatus Grossh. Fl. Kavk. I (1928) 267, non L. — O. latifolius Grossh. l.c. p. 268, p. pte?, non L. — Ic.: Fleischm. l.c., p. 36, fig. 7; tab. II, fig. 2.

Perennial; tubers flattened, 3- or 4-lobed, the lobes tapering into rootlike tips; stem hollow, rather stout, (10) 15–35 (40) cm long and at base to 9–10 mm thick; leaves 4–7, apparently never spotted, slightly narrowed toward base; lower leaves obtuse, oblong-lanceolate or oblongly ovate-lanceolate, 4.5–10 (14) cm long and 1.5–3.5 cm broad (breadth to length ratio (1:2) 1:3.3–1:4); upper leaves narrower, acuminate; spike

short-cylindric or cylindric, 4–9 cm long and 1.5–3 (3.5) cm in diameter, densely many-flowered; bracts lanceolate, rather short and subobtuse, the lower longer than the flower, the middle 1.7–2.5 cm long and 3.5–6 mm broad; flowers violet-purple; lip with a faint pattern of darker violet speckles, densely and minutely papillose above; sepals ovate-lanceolate, obtusish; median sepal concave, 3-nerved, 7–8 mm long and ca. 3 mm broad; lateral sepals inequilateral, 7.5–9 mm long and to 3–4 mm broad; commonly 3- or 4-nerved; lip 6–7 (8) mm long, 8–10 (11) mm broad,
716 broadly rhomboid-orbicular in outline, shortly and sometimes obscurely 3-lobed at apex, the lobes obtuse, the lateral always crenate; spur always longer than the lip, but only about two-thirds the length of ovary, conical-cylindric or subsaccate-cylindric, stout, slightly curved and somewhat attenuate toward the end but obtusish, (7–8) 9–10 mm long and 2.5–3 (3.5) mm thick. June-July.

Wet meadows. — Caucasus: Dag., E. and S. Transc. **Gen. distr.**: Arm.-Kurd. Described from Turkish Armenia, Meleto-dag. Type in Vienna.

Note. Displays kinship with O. osmanica Klinge (= Orchis holocheilos Soó), from which it differs in the following features: spur longer than the lip; lip smaller and with 3 distinct short lobes and a crenulate margin. O. osmanica does not occur in the USSR.

35. **O. cruenta** Muell. Fl. Dan. (1782) t. 876. — O. latifolia γ cruenta Lindl. Gen. et Sp. Orch. (1835) 260. — O. incarnata var. cruenta Schmal'g., Fl. II (1897) 458. — O. cruentiformis Neum. in Bot. Not. (1909) 243, p. pte. — Ic.: Muell. l. c. t. 876.

Perennial; tubers compressed, 2–4-parted; stem 11–35 cm long, hollow, above base 4–6 cm thick, erect, leafy all the way up; leaves 3 or 4 (5), slightly spreading or ascending, broadly lanceolate or lanceolate or oblong-lanceolate, subobtuse, densely covered above with small spots, the underside mostly also spotted or violet-tinged; lower and middle leaves (3.5) 6–11 (13.5) cm long and (1.3) 1.5–2.6 cm broad, the breadth to length ratio (1:2.3) 1:3–1:6.5 (1:9); uppermost leaves shorter and narrower, surpassing the base of spike; spike densely many-flowered, short-cylindric, 3–10 cm long, 2.2–3 (3.2) cm broad including the spreading bracts; bracts lanceolate, acuminate, more or less violet and commonly spotted, the lower exceeding and the upper mostly equaling the flower; flowers small, violet-purple or violet-rose; lip with a more or less pronounced dark violet pattern; sepals oblong-ovate, obtuse, 3-nerved; median sepal concave, 5–6 mm long; lateral sepals inequilateral, 5.5–7 mm long and ca. 2.8 mm broad, often with few darker speckles; petals inequilateral, ovate-lanceolate, obtuse, ca. 5–5.5 mm long; lip minutely papillose above, broadly rhomboid-oval, entire, obtuse with a somewhat produced obtuse tip, scarcely crenulate, (4) 5–6 mm long, 5–6 mm broad; spur conical to cylindric-conical, obtusish, scarcely curved, 4.5–6 mm long and at base 1.5–2 mm thick, often barely produced or flush with the lip surface. June-July.

Wet swampy meadows. — E. Siberia: Lena-Kol, Dau., Ang.-Say.;
717 W. Siberia: Ob, U. Tob. (N. part); European part: Transv., V.-Ka.? V.-Don, U. V., Lad.-Ilm. **Gen. distr.**: Scand. Described from the vicinity of Röros in central Norway.

Note. The spots on the leaves of O. cruenta often disappear in drying, and thus considerable difficulties are involved in attempts to distinguish dried specimens from those of O. latifolia. There is need for thorough investigations on the distribution of this species in the USSR based on study of live material. But it may already be indicated at this stage that this species has a distinct distribution area that spreads over Siberia, the NE half of the European USSR, and Scandinavia; and in some places (e.g., the Upper Volga region) it is more common than O. latifolia. There are as yet insufficient grounds for referring to O. cruenta the species O. purpurea relatively recently established by T. and T.A. Stephenson (in Journ. Bot. (1920) 164). M. Godfery (Monogr. a. Icon. Brit. Orch. (1933) 218) writes that the spots on the leaves of O. purpurella are very few, small and confined to the upper surface, whereas the leaves of O. cruenta are densely spotted on both the upper and the lower surface. In fact, O. cruenta, which the author observed in live condition in the Argayash area (east of the Urals) and in the Upper Volga region, mostly has leaves intensely spotted on both surfaces. On the other hand, in the Kalinin area the author has come across specimens which, as far as the character of leaf spottiness is concerned, he would indeed be tempted to identify with O. purpurella T. and T.A. Steph.

36. **O. latifolia** L. Sp. pl. ed. 1 (1753) 941 excl. var. δ; Fl. suec. ed. 2 (1755) 312. — O. incarnata Ldb. Fl. Ross. IV, 56, p.p.; Shmal'g., Fl. II, 458; Kryl., Fl. Zap. Sib. III, 684, pp., non L. (O. incarnata L. = O. sambucina L.). — O. lanceolata Dietr. Fl. Boruss. (1833) tab. 5. — Ic.: Rchb. Ic.: Fl. Germ. XIII–XIV (1851) tab. 45. — Exs.: Fl. Hung. (Herb. Mus. Nat. Hung. Bud.) No. 86; Fiori, Beguinot, Pampanini, Fl. Ital. No. 423.

Perennial; tubers compressed, 2–4-parted; stem 25–55 cm long, hollow, above base to 10 mm thick, somewhat attenuate upward, erect, leafy all the way up; leaves 4–6, erect, narrowly lanceolate or linear-lanceolate, gradually attenuate toward apex, subobtuse and cucullate at apex, spotless; lower and middle leaves (8) 11–20 cm long and 1.4–2.8 cm broad, the breadth to length ratio (1:4.2) 1:5.5–1:8.3; uppermost leaves shorter and narrower, surpassing the base of inflorescence; spike densely many-flowered, cylindric, 4–12 cm long and 2.5–3 cm broad including the spreading bracts; bracts commonly exceeding the flower, the uppermost forming a tuft above the unopened flower, lanceolate, acuminate; flowers small, lilac-rose; lip with a darker-purple-violet pattern; sepals oblong-ovate, obtuse, 3-nerved; median sepal concave, 5–5.5 mm long; lateral sepals inequilateral, 5–7 mm long and 2.75–3 mm broad, mostly with few
718 darker speckles; petals inequilateral, ovate-lanceolate, obtuse, 4.75–5.25 mm long; lip (4.25) 4.5–5.5 (6) mm long and 5–7 mm broad, minutely papillose above, broadly rhomboid, entire, obtuse, sometimes with a produced tip and perceptibly 3-lobed, the margin scarcely crenulate; spur paler than perianth segments, conical or cylindric-conical, obtuse, scarcely curved, 5–6 (6.5) mm long and ca. 1.5–2 mm thick, somewhat longer than the limb of the lip. May-July. (Plate XLII, Figure 7).

Wet swampy meadows. — European part: Kar.-Lap., Dv.-Pech., V.-Ka., U. Dnp., L. Don, Crim., L.V., Transv.; Caucasus: Cisc.; W. Siberia: U. Tob., Ob, Irt., Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Dzu.-Tarb.,

T. Sh. (E. part). Gen. distr.: Dzu.-Kash., NW Mong., Scand., Centr. Eur., Atl. Eur., W. Med., Bal.-As. Min. (NW part). Described from Europe. Type in London.

Note. Specimens with yellowish-white flowers (var. ochroleuca Boll.) occur very rarely.

Genus 349. **ANACAMPTIS*** L. C. RICH.

L.C. Rich in Mem. Mus. Par. IV (1818) 17.

Lateral sepals spreading; median sepal elliptic-ovate, concave, forming a hood with the petals; lip with 2 longitudinal ridges near base, 3-lobed, the lobes subequal obtuse, the median narrower oblong, the lateral oblong-rhomboid; spur filiform, long, pendent, nearly straight, obtusish, about the length of ovary; column straight; anther elliptic, with parallel locules; rostellum small, forming a thickened plate between the bases of anther locules; caudicles of pollinia adhering to a single nearly round gland, this contained in a bursicule; ovary sessile, cylindric, twisted; bracts membranous; tubers undivided, ellipsoid or ovoid.

1. **A. pyramidalis** (L.) L.C. Rich in Mém. Mus. Par. IV (1818) 41; Ldb. Fl. Ross. IV, 64; Boiss. Fl. Or. V (1884) 57. — Orchis pyramidalis L. Sp. Pl. ed. I (1753) 940; Shmal'g., Fl. II, 458. — Aceras pyramidalis Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) 6. — Orchis condensata Desf. Fl. Atl. II (1800) 316. — Anacamptis condensata C. Koch in Linnaea XXII (1849) 285. — Ic.: Rchb. f. l.c. t. 9. — Exs.: HFR No. 896, 896-a.

Perennial; tubers ellipsoid or ovoid; stem 25–65 cm long, leafy below and with long-acuminate green amplexicaul sheaths higher up; leaves linear,
719 acuminate, 10–25 cm long, 0.7–1.4 cm broad; inflorescence ovoid-pyramidal, densely many-flowered, 2.5–8 cm long, 2.3–4 cm in diameter; bracts 1-nerved, long-acuminate from an oval-lanceolate base, shorter than the flower; flowers purple-red (rarely pink or white); sepals 4–6 (7) mm long, the median 1-nerved, the lateral commonly 2-nerved; petals 1-nerved, about equaling the sepals; lip 6–8 (9) mm long and 7–10 (11) mm broad, the median lobe ca. 4 mm long and 2 mm broad; spur to 1.3–1.4 cm long. (May)-June-(July). (Plate XLIII, Figure 3, a).

Glades and thickets. — European part: Crim., U. Dnp. (Kiev?); Caucasus: Cisc., W. and E. Transc., Dag., S. Transc., Tal. **Gen. distr.**: Atl. Eur., Centr. Eur., W. and E. Med., Bal.-As. Min., Iran. Described from Switzerland. Type in London.

Genus 350. **HIMANTOGLOSSUM**** W. D. KOCH.

W.D. Koch in Syn. Fl. Germ. et Helw. (1838) 689. — Loroglossum L.C. Rich., in Mem Mus. Par. IV (1818) 47, p.pte. — Himantoglossum Spreng. Syst. III (1826) 675, p.pte.

Sepals and petals forming a food; sepals elliptic to oblong-elliptic; petals lance-linear, entire or shortly 3-lobed; lip very long, greatly

* From Greek anacampto, turn upward; it is not clear why Richard employed this verb in forming the new generic name.

** From Greek himas, belt, strap (the original inflexion – himantos) and glossa, tongue, referring to the lorate median labellum lobe.

exceeding the other perianth segments, 3-lobed; lateral lobes shorter, triangular or linear-subcordate; median lobe lorate, narrowly linear, notched or 2-lobed at apex, initially twisted; spur conical or cylindric, short, as long as or shorter than ovary; column straight; anther large, obtuse; pollinia ovoid, with thickish caudicles, the common gland semiorbicular or elliptic, contained in a hemispherical bursicule; ovary cylindric, twisted, short-stipitate; bracts membranous; tubers entire, ellipsoid.

1. Median labellum lobe 3.5–6.5 cm long, deeply parted into 2 narrow lobes . . . . . 1. **H. caprinum** (M. B.) Spreng.

\+ Median labellum lobe 1.3–1.6 cm long, scarcely notched at apex . . . . . 2. **H. formosum** (Stev.) C. Koch.

1. **H. caprinum** (M. B.) Spreng. Syst. III (1826) 694. — Orchis caprina M. B. Fl. Taur.-Cauc. III (1819) 602. — Aceras caprina Lindl. Gen. et Sp. Orch. (1835) 282; Ldb. Fl. Ross. IV, 68. — Loroglossum caprinum Beck. in Ann. Nat. Hofm. Wien. V (1890) 571. — Himantoglossum hircinum β caprinum Richt. Pl. Eur. I (1890) 276. — Ic.: R. Schlechter Monogr. u. Icon. Orch. Eur. I, 5–6 (1927) fig. 44.

720 Perennial; tubers ellipsoid; stem erect, 50–75 mm long and to 8–10 mm thick, with 4 or 5 leaves in lower part and 3 or 4 foliaceous sheaths higher up; leaves oblong, narrowed at both ends, to 16 cm long and 2–3 cm broad; raceme erect, loosely (9) 15–20 (24)-flowered, 19–30 (48) cm long; bracts linear, long-acuminate, 2–4 cm long, exceeding the ovary; flowers spreading, the sepals and petals forming an ovoid hood, this whitish-green outside, spotted reddish-violet within; median sepal oblong, obtuse, concave, 3-nerved, 10–11 mm long; lateral sepals cordate, commonly 4-nerved, 13 mm long; petals linear, slightly narrower, obtusish, 2-nerved, slightly shorter than sepals; lip pendulous, 4–7.5 cm long (up to the apex of median), minutely papillose at base; lateral lobes falcately recurved, acuminate, along the outer margin ca. 9 mm long; median lobe lorate, 3.5–6.5 cm long and 2–2.25 mm broad, slightly twisted, the narrowly linear apical lobules to 1.5 cm long; base of lip whitish-greenish with reddish-violet dots, the lorate median lobe and the lateral lobes brownish-green or olivaceous; spur conical, slightly curved, ca. 4–5 mm long; column 5.5 mm long. June. (Plate XLIII, Figure 5, a–e).

Calcareous soil in light woods and thickets. — European part: Crim. Endemic. Described from the Crimea. Type in Leningrad.

2. **H. formosum** (Stev.) C. Koch in Linnaea XXII (1849) 287. — Orchis formosa Stev. in Mém. Soc. Nat. Mosc. IV (1813) 66. — Aceras formosa Lindl. Gen. et Sp. Orch. (1835) 282; Ldb. Fl. Ross. IV (1853) 68; Boiss. Fl. Or. V (1884) 56. — Orchis mutabilis Stev. in Mém. Soc. Nat. Mosc. III (1812) 244, nom. nud.; in Transc. Linn. Soc. XI (1815) 417 t. 39. — Ic.: R. Schlechter Monog. u. Icon. Orch. Eur. I, 5–6 (1927) fig. 48.

Perennial; stem 50–70 cm long and to 1 cm brick, bearing leaves in lower part and acuminate sheaths higher up; leaves oblong to oblong-lanceolate, subobtuse, 7.5–15 cm long and 1.5–2.75 cm broad; raceme erect, loosely many-flowered, to 30 cm long; bracts linear-lanceolate,

subobtuse, the lower exceeding and the upper equaling the flower; flowers 15–30, spreading; sepals purple with greenish margins; median sepal oblong-elliptic, obtuse, concave, 3-nerved, 9.5–12 mm long, ca. 5 mm broad; lateral sepals connivent with the median into a hood, inequilateral, oblong, obtuse, 3-nerved, as long and broad as the median sepal; petals 1-nerved, ca. 10 mm long and 3 mm broad, 3-toothed, rhomboidally dilated at the middle, with 2 minute obtuse lateral teeth, the long median tooth suffused with light purple; lip ca. 2.5 cm long, at base obcuneate, 6–8 mm
721 broad, purple, undulate and greenish on the margin, with very short oblong obtuse lateral lobes; median lobe ligulate, 1.3–1.6 cm long, brownish-greenish (olivaceous), slightly enlarged and notched at apex, 2.5–3 mm broad; spur slightly curved, cylindric, obtuse, ca. 9 mm long, half as long as ovary; column straight, ca. 6 mm long. May-June. (Plate XLIII, Figure 4).

Shrub thickets in lower mountain zone. — Caucasus: Dag., E. and S. Transc., Tal. Endemic. Described from the vicinity of Kuba. Type in Helsinki; cotype in Leningrad.

Genus 351. **SERAPIAS*** L.

L. Syst. ed. 5 (1754) 406.

Sepals and petals long-acuminate, connivent in a hood; lip spurless, minutely clawed and with an undivided or 2-lobed callus at base, divided by a constriction into a posterior and an anterior portion; gynochil broadly reniform, with rounded upturned lateral lobes; epichil lanceolate, long-acuminate, longer and narrower, spreading downward at a right angle to the gynochil; column straight; connective of anther to 5 mm long, subulate, with a channeled appendage below; pollinia clavate, the caudicles attached to a common round or reniform gland, this contained in a hemispherical bursicule; rostellum straight and short; stigma concave, oval; ovary sessile, straight; bracts membranous; tubers undivided, ovoid to subglobose.

1. S. **vomeracea** (Burm.) Briq. Prodr. Fl. Cors. I (1910) 378. — Orchis vomeracea Burm., Fl. cors. (1770) 237. — Helleborine longipetala Ten. Fl. Nap. Prodr. (1811) p. LIII. — Serapias longipetala Poll. Fl. Veron. III (1824) 30; Ldb. Fl. Ross. IV, 76. — S. pseudocordigera Moric. Fl. Venet. (1820) 374; Boiss. Fl. Or, V (1884) 54. — Ic.: R. Schlechter, Monogr. u. Ic. Orch. Eur. I, 5–6 (1927) fig. 38. — Exs.: Fl. Cauc. exs. No. 80.

Perennial; tubers ovoid or subglobose; stems erect, 20–50 cm long, with 3 or 4 leaves at base and 3 or 4 similar leaves or foliaceous bracts higher up; leaves linear to linear-lanceolate, acuminate, 8–14 cm long, 0.9–1.4 cm broad; inflorescence to 12 cm long, 3–10-flowered; bracts erect, large, elliptic-lanceolate, acuminate, 4–6 cm long, purple, with numerous darker nerves, equaling or exceeding the flower; sepals lanceolate, strongly acuminate, greenish- to reddish-brown, dark red within, 5-nerved, 2–2.7 cm long, the lateral inequilateral; petals prolonged
722 from a dark purple ovate base into a long narrowly linear acuminate limb,

* Probably from Serapis, the name of an Egyptian deity.

slightly shorter than sepals; lip to 3 cm long, short-clawed, with basal callosity of two small thickish lamellae, slightly papillose-hairy at the middle; gynochil reniform, to 8 mm long and 1.7 cm broad, with rounded dark purple lateral lobes; epichil pendulous, oblong-lanceolate, reddish-brown, 1.6–2.3 cm long and above the middle 0.8–0.9 cm broad; callosities at base of lip whitish or reddish; column including the subulate process of the connective to 1.2 cm long. May-(June). (Plate XLIII, Figure 6, a–c).

Meadows. — Caucasus: W. Transc. **Gen. distr.**: W. Med., Bal.-As. Min. Described from Corsica.

Genus 352. **OPHRYS*** (L.) SWARTZ.

[L. Gen. Pl. ed. I (1737) 272, ed. 5 (1754) 406] char. reform. Swartz in Acta Holm. (1800) 22.

Perianth segments spreading; sepals oblong-or elliptic, obtuse, glabrous; petals much smaller, oblong-linear or ligulate, densely pubescent, rarely glabrate; lip spurless more or less convex, undivided or 3-lobed, velutinous, resembling in some species both in shape and coloring a bee or bumblebee, commonly with 2 tubercles or pointed hornlike appendages at base, rarely without them; column rather long, straight or nearly so; anther obtuse or the connective with a cuneate process; pollinia with caudicles; glands contained in 2 distinct bursicules; rostellum obsolescent; stigma concave; ovary slightly twisted; flowers in a loose racemose inflorescence; bracts membranous; tubers globose or ellipsoid.

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1. Lip almost flat, notched at apex . . . . . 1. **O. muscifera** Huds.
+ Lip convex, with a small apical appendage, obtusish . . . . . 2.
2. Sepals yellowish-green, more rarely bicolor within, the upturned part greenish, the lower part pinkish . . . . . 3.
+ Sepals pink or lilac, green-veined. . . . . 6.
3. Lip 3-lobed, rarely obscurely lobed and then the beaklike anther appendage ca. 2 mm long. . . . . 4.
+ Lip entire, elliptic or rounded-obovate; beaklike anther appendage ca. 1 mm long. . . . . 5.
4. Lip bigibbous at base; beaklike appendage of anther ca. 2 mm long. . . . . 2. **O. transhyrcana** E. Czerniak.
+ Base of lip with 2 large mammiform gibbi to 1.5 mm high; appendage of connective very small, ca. 1 mm long . . . . . 3. **O. caucasica** Woron.
5. Lip scarcely gibbous at base or with very small gibbi not more than 1 mm high. . . . . 3a. **O. caucasica** Woron. f. **cyclocheila** Nevski.
+ Base of lip with large mammiform gibbi 2.5–3 mm high . . . . . 4. **O. taurica** (Agg.) Nevski.
6. Apical appendage of lip upcurved; beaklike process of connective ca. 1.25 mm long, straight . . . . . 5. **O. oestrifera** M. B.
+ Apical appendage of lip recurved toward the lower lip surface; beaklike process of connective ca. 3 mm long and more or less S-shaped . . . . . 6. **O. apifera** Huds.

Section 1. **MYODES** Schlechter in Keller et Schlechter, Monogr. u. Icon. Or. Eur. I, 3–4 (1926) 90, charact. reform.; Sect. Europhrys

* Greek ophrys, eyebrow; applied by Pliny to some 2-leafed plant (Listera?).

Plate XLIII

1. Steveniella satyrioides (Stev.) Schlechter, 1a) flower; 1b) hood; 1c) lip; 1d) petal; 1e) pollinarium.— 2. Comperia taurica C.Koch, 2a) petal; 2b) column with anther.— 3. Anacamptis pyramidalis (L.) L.C.Rich., lip; 3a) pollinarium with common gland,— 4. Himantoglossum formosum (Stev.) C.Koch, lip.— 5. H. caprinum (M.B.) Spreng., a) flower; b) lip; c) petal; d) column with anther; e) pollinarium.— 6. Serapias vomeracea (Burm.) Briq., flower; 6a) lip; 6b) petal; 6c) column.— 7. Ophrys taurica (Aggeenko) Nevski.— 8. O. muscifera Huds., flower.— 9. O. oestrifera M.B., flower, 9a) column.— 10. O. apifera Huds., flower; 10a) lip.

subsect. Musciferae Godfery in Journ. of Bot. (1928) 36. — Lip notched at apex, 3-lobed, slightly convex; sepals greenish; anther obtuse.

1. **O. muscifera** Huds. Fl. Angl. ed. I (1762) 340. — Orchis muscifera Salisb. Prodr. (1796) 7. — Ophrys insectifera α myodes L. Sp. Pl. ed. 1 (1753) 948. — O. myodes Jacq. Ic. Pl. rar. I (1781–86) t. 184; Ldb. Fl. Ross. IV (1853) 74; Shmal'g., Fl. II, 459. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 95. — Exs.: Fl. Austro-Hung. No. 1856.

726 Perennial; tubers globose or oblong, ca. 1 cm thick; stems 15–40 cm long, with 3–5 leaves in lower part; leaves oblong-lanceolate to oblong, subobtuse, 3–12 cm long, 1–2.5 cm broad at the middle; uppermost leaf vaginate, amplexicaul; inflorescence loosely (2) 5–9-flowered, to 17–20 cm long; bracts linear-lanceolate, acuminate, the lower equaling or slightly exceeding and the upper shorter than the flower; median sepal ovate, obtuse, 3-nerved, concave, 6–8 mm long, 4 mm broad; lateral sepals barely longer, oblong-ovate, inequilateral, 3-nerved; petals linear-subulate, obtuse, 1-nerved, minutely puberulous, 4–5 mm long, reddish-brown; lip oblong-obovate in outline, 3-lobed, densely covered with minute papillae, velutinous, dark reddish-brown, with a glabrous square azure-colored blotch at center; lateral lobes very small; median lobe deeply emarginate; entire lip 9–10 mm long and 6–7 mm broad; column about half the length of the median sepal; ovary 9–12 mm long, June-July. (Plate XLIII, Figure 8).

Meadows, thickets on calcareous soil, and rarely swamps. — European part: Lad.-Ilm., U.V., V.-Ka. (former Kostroma County), Kar.Lap. (Munozero). **Gen. distr.**: Scand., Centr. Eur., Atl. Eur., Bal.-As. Min. (NW part), W. Med. Described from England.

Note. According to Zinger (Sb. sv. (1885), p. 421), the Kostroma plant differs in having a white blotch on the lip. but such coloring may generally be observed in isolated specimens.

Section 2. **ARACHNITES** Schlechter in Keller et Schlechter Monogr. u. Iconogr. Orch. Eur.I, 3–4 (1926) 97. — Lip terminating in a small appendage, subobtuse, entire or 3-lobed, convex; sepals yellowish-greenish or rarely the lateral ones bicolor on the proximal side, the lower part slightly flushed with pink; connective of anther with a beaklike process.

2. **O. transhyrcana** E. Czerniak. in Not. Syst. ex Herb. Horti Bot. Petrop. IV (1923) 1.

Perennial; tubers subglobose, 1–1.5 cm in diameter; stems 24—45 cm long, with a white membranous basal sheath; leaves 4 or 5, borne on the lower part of the stem, oblong-lanceolate to oblong, 5–6 mm long, 1.5–2 cm broad; sheaths above the leaves 2 or 3, foliaceous, acuminate; inflorescence 5–15 cm long, loosely 2–6-flowered; bracts 1.5–3 cm long, 4–6 mm broad, lanceolate, yellowish-green, slightly exceeding the ovary; sepals oblong-lanceolate, slightly cucullate, obtuse, 3-nerved, yellowish-green, 10–15 mm long, 4 mm broad, glabrous, the lateral slightly inequilateral;
727 petals narrowly linear, obtusish, ciliolate-margined, 6–8 mm long, 1.5 mm broad, half as long as petals; lip 11–14 mm long and as long, velutinous,

broadly obovate in outline, slightly and often obscurely bigibbous, 3-lobed from above the middle, with very small oblong-triangular obtuse long-pilose lateral lobes and a large, nearly round median lobe, or sometimes with hardly perceptible lobes, dark raspberry-colored with a bluish-gray H-shaped mark, this consisting of two parallel slightly divergent lines confluent at base and at the middle; margin of median lobe slightly upturned, buff-colored; column 7 mm long; beaklike process of anther greenish, straight, to 2 mm long. April.

Grassy mountain slopes and shrub thickets. — Centr. Asia: Mtn. Turkm. **Gen. distr.**: Iran. (Astrabad Province, Sintenis No. 1514). Described from a spring near Alty-vaem (Kara-Kala area). Type in Leningrad.

3. O. **caucasica** Woron. in Acta Horti Tiflis. VIII, 3 (1908) 70, nom. nud.; Grossh., Fl. Kavk. I (1928) 261. — O. Ferrum equinum C.A.Mey. Verzeich. (1831) 39, non Desf. — O. atrata auct. fl cauc., non Lindl.

Perennial; tubers subglobose, 0.8–1.5 cm in diameter; stem (7.5) 20–35 cm long and to 4 mm thick, with leaves crowded on the lower part and 2 green acuminate sheaths higher up; leaves oblong-lanceolate, subobtuse, 6–8.5 cm long and to 2.5 cm broad; inflorescence loosely (2) 4–10-flowered, (2.5) 5–18 cm long; sepals 10–12 mm long, 4–4.5 mm broad, oblong-lanceolate to oblong-elliptic, obtuse, yellowish-green, 3-nerved, inequilateral; petals linear-lanceolate, obtuse, 6–7 mm long, ca. 2 mm broad, 1-nerved, glabrate, greenish-brown; lip velutinous, broadly obovate in outline, entire (in f. cyclocheila Nevski) or 3-lobed, with very short oblong-triangular obtuse lateral lobes and a spatulately reniform-cordate median lobe, produced at apex into a very short callous process, dark reddish-brown bluish-violet (?) H-shaped mark and 2 small mammiform basal gibbi to 1.5 mm high; total length of lip 12–13 mm, the breadth between the tips of lateral lobes 10–12 mm; column 5–6 mm long; beaklike process of anther straight, ca. 1 mm long. May.

Meadow slopes. — Caucasus: W. Transc. (Tsebel'da near Sukhumi). E. Transc. (f. cyclocheila Nevski predominant, the typical form occurring only in the Tiflis area), Dag. (f. cyclocheila Nevski). Endemic. Described from Tsebel'da. Type in Tiflis; cotype in Leningrad.

Note. In respect of lip shape and other characters, O. caucasica approaches most closely O. transhyrcana E.Czerniak., but the process of
728 the connective is shorter and the tubercles at the lip base are much larger.

As regards Ophrys caucasica Woron. f. cyclocheila Nevski (Ophrys cyclocheila Nevski in sched.), this form gravitates decidedly toward the eastern periphery of Transcaucasia and it may possibly be a distinct species. The color of its flowers has not been sufficiently ascertained. C.A. Meyer, who collected it "in collibus siccis provinciae Baku" and, after much hesitation, referred it to the Greek O. ferrum equinum Desf., describes the pattern on the upper surface of the lip as pink.

4. O. **taurica** (Agg.) Nevski comb. nova. — O. aranifera Huds. var. taurica Aggéenko in Scripta Bot, Horti Univ. Imp. Petrop. I (1886–87) 291. — O. aranifera Huds. var. our sous-esp. — O. taurica E.G. et A. Camus, Iconogr. Orch. Eur. II (1929) 333. — O. aranifera Kränzl. Orch. Sib. Enum. in Fedde, Repert. Beih. LXV (1931) 13, ex parte, non

Huds. — O. atrata var. taurica Schmalh. in Fl. Sr. i Yuzhn. Ross. II (1897) 460. — O. mammosa E. Wulff, Fl. Taur., 13 (1920) 80 (non Desf.). — Ic.: Aggéenko, Flora taurica I (1890) tab. 2, in Trav, Soc. Nat. St. Pétersb. XXI (1890).

Perennial; tubers subglobose, to 2 cm in diameter; stems (25) 30–58 cm long and to 5 mm thick, with a membranous basal sheath, leaves crowded on the lower part, and 2 or 3 green acuminate sheaths higher up; leaves oblong-lanceolate, the lower sometimes subelliptic, obtuse, to 9 cm long and 2–3 cm broad, narrowed toward base; inflorescence loosely 3–8-flowered, (7) 10–28 cm long; bracts oblong-lanceolate, acuminate, equaling or slightly exceeding the ovary; median sepal oblong, obtuse, 13 mm long, 4.5–5 mm broad, greenish outside, greenish with tawny-pink margins within; lateral sepals the same length and to 6 mm broad, inequilateral, 3-nerved, greenish outside, bicolor within, the lower part pink, the narrower upper part green; petals 0.7–0.8 cm long, 0.2–0.3 cm broad, ligulate, 1-nerved, yellowish or brownish, glabrate; lip 10–15 mm long, 9–11 mm broad, velutinous, rounded-ovate in outline, convex, entire, terminating in a triangular green appendage 0.5 mm long, dark violet-brown, with a glabrous azure-colored mark, this consisting of two oblong lines joined at upper end by a short transversal line, the junctures dotted with darker azure; base of lip with a large hairy mammiform gibbi 2.5–3 mm high; lower lip surface pink with green margins; column 6–7 mm long; beaklike appendage of anther straight, ca. 1 mm long. April-May. (Plate XLIII, Figure 7).

Stony slopes. — European part: Crim.; Caucasus: W. Transc. (near Sochi). Endemic. Described from the Crimea. Type in Leningrad.

729 Note. A species related to the European O. atrata Lindl., O. aranifera Huds. and O. mammosa Desf., described from Greece, but differing markedly from these species. The lip of O. aranifera is notched and yellow-margined. In O. atrata Lindl., as opposed to our species, the lip is also notched and the gibbi are more densely covered with longer hairs. As regards O. mammosa Desf., some monographers of Orchidaceae (E. G. Camus, R. Schlechter) maintain that it is identical with O. atrata; but on the illustration given by Desfontaines (Choix de Plant. (1808), t. 2), the lip margin of this species is rounded-toothed — a feature distinguishing it from both O. atrata Lindl. and O. taurica. All the same, O. mammosa, distributed in Greece and much smaller than O. taurica, approaches this species most closely.

Section 3. **POICILOPHRYS** Schlechter in Keller et Schlechter Monogr. u. Icon. Orch. Eur. I, 3–4 (1926) 114. — Lip terminating in a lanceolate upcurved or recurved appendage, deeply 3-lobed, convex; sepals lilac or pink, green-spotted; anther with a beaklike process.

5. **O. oestrifera** M. B. Fl. taur.-cauc. II (1808) 369; Ldb. Fl. Ross. IV, 75; Boiss. Fl. Or. V (1884) 79; Shmal'g., Fl. II, 460; E. Wulff, Fl. Taur. I, 3 (1930) 81. — O. cornuta Stev. in Mém. de la Soc. Nat. de Mosc. II (1809) 174. — O. oestrifera var. cornuta Boiss. Fl. Or. V (1884) 79. — O. bremifera Stev. in Mém. Soc. Nat. de Mosc. II (1809) 174. — O. Proteus Radozytski in "Zhurnal Sadovodstva" (Horticultural Journal)

(1842) No. 4 p. 46 (cum tab.). — Ic.: R. Schlechter, Monogr. u. Icon. Eur. I, 5–6 (1927) fig. 24.

Perennial; tubers subglobose to ellipsoid, 0.8–1.75 cm in diameter; stems 20–45 cm long, with 2–5 leaves at base and acuminate green amplexicaul sheaths higher up; leaves oblong, obtuse or subobtuse, 5–10 cm long and to 2–(3) cm broad; inflorescence loosely (2) 3–8 (13)-flowered, 5.5–20 (25) cm long; bracts linear-lanceolate, acuminate, green, commonly somewhat exceeding the ovary; sepals 12–14 mm long, 4.5–5 mm broad, pale lilac, 3-nerved, the median oblong-obovate and very obtuse, the lateral oblong inequilateral obtuse; petals 3–4 mm long, ca. 1.5 mm broad, oval-lanceolate, obtuse, 1-nerved, lilac, velutinous within; lip blackish-brown, velutinous, narrowed at base, broadly oval in outline, 3-lobed above the middle; lateral lobes ligulate, incurved, obtuse, each bearing a long slender ascending densely hairy horn; median lobe suborbicular, large, terminating
730 in an upcurved subobtuse appendage 2 mm long; upper lip surface with a horseshoe-shaped glabrous bluish-violet mark, this surrounded by a narrow yellow rim; each side of the lip similarly marked with a yellow-rimmed spot; horns 5–8 mm long, acuminate, enlarged at base, tawny with a green tip; in var. b r e m i f e r a (Stev.) Richt. (Pl. Eur. I (1890) 264) the horns not more than 2 mm long; total length of lip 12–14 mm, the breadth 8–11 mm. (March) April-May. (Plate XLIII, Figure 9, a).

Coppices and light woods. — European part: Crim.; Caucasus: W., E. and S. Transc. (var. b r u m i f e r a). Gen. distr.: Bal.-As. Min. Described from the Crimea. Type in Leningrad.

6. **O. apifera** Huds. Fl. Angl. ed. I (1762) 340. — O. a p i f e r a Huds. var. O l y m p i a d a e Ugrinsky in Monit. Jard. Bot, Tiflis 22 (1912) 17. — O. a p i f e r a subsp. O l y m p i a d a e Ugrinski ap. G. Cam. Atlas Icon. Orch. Eur. (1921) p. 5. — Ic.: Rchb. f. Ic. Fl. Germ. XIII–XIV (1851) t. 105.

Perennial; tubers subglobose to ellipsoid, rather small, ca. 1 cm in diameter; stems 20–45 cm long and to 7 mm thick; leaves 4–7, the lower broadly lanceolate acuminate 5–10 cm long and 1.5–2.8 cm broad, the upper smaller and amplexicaul; inflorescence to 18 cm long, loosely 3–8-flowered; bracts lanceolate, pale green, exceeding the ovary; sepals glabrous, oblong-elliptic, obtuse, 14–15 mm long and to 7 mm broad, 5-nerved, bright pink or whitish-pink, the lateral inequilateral; petals ca. 3–4.5 mm long, 3-nerved, velvety-pubescent, obtusish, greenish or faintly pink; lip convex, velutinous, broadly oval, 3-lobed, with a deep incision on each side; lateral lobes ovate-triangular, obtuse, curved downward, long-pubescent; median lobe large, broadly rhomboid, long-lanceolate-pointed, the appendage recurved toward the lower lip surface, hence the lip apparently entire and rounded in outline; lip including appendage 11–12 cm long [sic], and between the tips of lateral lobes ca. 1 cm broad; lateral lobes to 5 mm long; median lobe 7–8 mm long and 8–10 mm broad; apical appendage ca. 3 mm long; the purplish-tawny surface of the lip marked at base with a singly subquadrate glabrous yellowish-brown or reddish-yellow spot, this surrounded by a double yellow rim; median lobe with two small yellow speckles; column twice as long as petals; beaklike process of anther to 3 mm long. May-June. (Plate XLIII, Figure 10, a).

Light woods and coppices. — European part: Crim.; Caucasus: W. and S. Transc. Gen. distr.: Atl. Eur., Centr. Eur., W. Med., Bal.-As. Min., E. Med., Iran. Described from England.

DIAGNOSES PLANTARUM NOVARUM

IN TOMO IV FLORAE URSS COMMEMORATARUM*

(DIAGNOSES OF NEW SPECIES MENTIONED IN VOLUME IV)

Octobri 1935

VERATRUM

1. **V. calycinum** Kom. sp. nova. — *V. Eschscholtzii* var. in Kom. Fl. Mansh. I, A. H. P. XX (1901) 435.

Caulis erectus validus plus quam metralis, folia membranacea sessilia late oblonga, acuta, subtus breviter ac sparse arachnoidea, supra glabra fusco-viridia, satis ampla. Inflorescentia racemosa ramosa laxa, axibus albo-tomentellis, pedunculi brevissimi, perigonii laciniae anguste lanceolatae obscure virides, margine dentatae, exteriores vena unica praeditae, interiores obsolete triveniae; omnes acutae intus glaberrimae extus tomentellae; fovea nectarifera linearis profundior ac major, ut in congeneribus.

Typus: in valle fl. Sutar 14/26 VI 1895 in silva acerosa legit V. L. Komarov; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

EREMURUS

2. **E. Korowini** sp. nova B. Fedtsch.

Radices numerosae, paulo incrassatae usque 10 cm longae; collum reliquiis foliorum vetustorum nigris, fibrosis, dense obtectum; scapus usque 80 cm. altus, parte inferiore breviter pubescens, ceterum nudus, usque 8 cm in diametro; folia breviter pubescentia, linearia, acutiuscula, usque 30 cm longa, usque 15 mm lata, racemum non attingentia. Racemus laxiusculus 20—30 cm longus florendi tempore 4—6 cm in diametro; bracteae linearilanceolatae, albomembranaceae, linea longitudinali fusca percursae, basi sparse ciliatae; pedicelli versus apicem adscendentes, tenues, apice articulati, florendi tempore flores paulo superantes; perigonium late campanulatum, foliola ejus alborosea, tenuia, 15—18 mm longa et circ. 5 mm lata; filamenta tenuia, albida, basi dilatata, lutescentia; stylus albus, filiformis; ovarium globosum.

Hab. in regione finitima Tadshikistaniae et Usbekistaniae.

Typus: ad traj. Kendyraus 20 V 1880 florens (A. Regel); in Usbekistaniae valle Angren, 2200 m. supra mare 19 VI 1924 (Korowin) fl. et fruct.; in Herb. Inst. Ac. Sc. URSS conservatur.

A specie affini *E. Olgae* Rgl. foliis pilosis differt, ab *E. Kaufmanni* Rgl. foliis minus dense pilosis, perigonii forma et colore differt.

* [This appendix has been reproduced photographically from the Russian original.]

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3. **E. Saprjagajevi** sp. nova B. Fedtsch.

Radices usque 20 cm longae; collum reliquiis numerosis fibrosis foliorum vetustorum obtectum; scapus usque 140 cm altus; folia loriformia, usque 2.5 cm lata, vix carinata, margine glabra. Racemus sub anthesi densiusculus, versus finem florendi laxus, multiflorus; bracteae e basi late lanceolata linearifiliformes, margine ciliatae; pedicelli sub anthesi suberecti, bracteis paulo breviores, apice articulati, tunc demum elongati et bracteas circ. duplo superantes, ab axi racemi sub angulo acuto reflexi; perigonium luteofuscum, foliola perigonii circ. 15 mm longa, lanceolata, nervo longitudinali percursa, perigonium sub anthesi subtubulosum, tunc demum infundibuliforme, foliola ejus non involuta; filamenta sub anthesi perigonii foliolis breviora, tunc demum ea superantia; ovarium globosum.

Hab. in regione subalpina Tadshikistaniae orientalis.

Typus: prope pagum Schurabad, 1932 legit Th. Saprjagajev; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

Ab *E. altaico* (Pall). M. B. perigonii foliorum forma, bracteis, pedicelli longitudine, foliorum forma differt.

GAGEA

4. **G. Joannis** Grossh. sp. nova. (Sect. *Nudiscaposae* Terr.)

Bulbus ovatus, mediocris; bulbus secundus minutus, foveolato-rugulosus, atratus; tunicae coriaceae fuscae; caules 3—10 mm alti; folium basale solitarium, inflorescentia $1^1/_2$-plo longius, anguste-lineare, fistulosum, 1.5—2 mm in diam.; folium floralium unicum, lanceolatum, inflorescentiam aequans vel eam paulo superans; folia superiora valde diminuta, lineari-subulata. Inflorescentia ramosa pauciflora; pedicelli tenues, floribus 2—3-plo longiores; phylla lutea, dorso virescentia, 9—10 mm longa, oblongolanceolata, obtusa vel obtusiuscula, interdum retusa; filamenta perigonio duplo breviora, antheris ovato-rotundatis, ovarium obovato-subcordatum; stylus ovarium aequans, sat tenuis. Capsula obovato-oblonga, perigonio paulo brevior.

Hab. in Transcaucasia australi (Armenia, respublica Nachiczhevan) in regione alpina.

Typus: in monte Tehe-donduran VII 1931, leg. I. Karjagin; in Herb. Azerb. centr. in Baku conservatur.

Species ex affinitate *G. spathaceae* (Hayne) Salisb., sed longe differt folio radicali solitario (nec binis), statura tenuiore, phyllorum forma etc. — Hanc speciem viro clarissimo Johanni Karjagini dedico. (Tab. XLIV, fig. 2, a—c).

5. **G. minuta** Grossh. sp. nova. (Sect. *Nudiscaposae* Terr.).

Bulbus parvus, solitarius, tunicis atro-fuscis tectus; caulis 2—5 cm altus, gracilis, tenuis; folium radicale solitarium, subcapillare, lineare, basi non attenuatum, 3—4 mm latum inflorescentia brevior vel eam aequans;

735 folium caulinum breve, lineare; internodium interdum nullum. Inflorescentia 1—4-flora; pedicelli inaequales, tenues, floribus 2—3-plo longiores, tenuiter crispule-villosi vel subglabri; perigonii phylla 7—9 mm longa, anguste-linearia, acuta vel acutiuscula, intus pallide-lutea, extus viridiuscula; antherae phyllis fere duplo breviores, parvae, ovato-rotundatae.

Hab. in montibus Bucharae.

Typus: Darvas, in valle Wangsch, supra castellum Wänsch 6000′ IV 1883 leg. Mussa; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

Affinis *G. filiformi* (Ldb.) Kunth et *G. pseudoerubescenti* Pascher sed differt caule humili, floribus parvis etc.

6. **G. Korshinskyi** Grossh. sp. nova (Sect. *Nudiscaposae* Terr.).

Bulbus parvus, solitarius, oblongo-ovatus, cum vaginis 15—18 mm altus; tunicae intimae albae, mediae griseae subcoriaceae, externae reticulato-fibrosae, in vaginis productae, caulis 8—15 cm altus. Folium radicale solitarium, inflorescentia longius, anguste-lineare, ad 2 mm latum, subcanaliculatum, folium florale solitarium, anguste-lineare, basi fere non dilatatum, inflorescentia brevius; folia summa parva, bracteata, tenuiter crispule-villosa. Inflorescentia ramosa, 2—7-flora; pedicelli erecti, inaequales, tenuiter crispule-villosi, floribus duplo vel triplo longiores; perigonii phylla oblongo-lanceolata, ad apicem attenuata, extus purpurascentia.

Hab. in prov. Darvas in montibus Bucharae.

Typus: Darvas, Ssary-dasch 8—9000′ 31 V 1897 leg. S. Korshinsky; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

Affinis *G. kopetdagensi* Vvedensky, sed elatior, pluriflora, floribus 10—11 nec 6—8 mm longis etc.

7. **G. longiscapa** Grossh. sp. nova ad interim (Sect. *Nudiscaposae* Terr.).

Bulbus mediocris solitarius, ovatus, tunicis fuscis vel griseo-fuscis vestitus; scapus 15—25 cm altus, gracilis; folium radicale solitarium, planum, 3—4 mm latum, inflorescentiam superans, apice attenuatum cucullatum, interdum glaucescens; folia floralia opposita, valde inaequalia; inferius inflorescentia brevius, anguste lineari-lanceolatum, ad 3—4 mm latum, superius lineare. Inflorescentia caule 5—8-plo brevior, 3—7-flora; pedicelli inaequales, tenues, floribus multo longiores, post anthesin erecti; perigonii phylla anguste lanceolato-linearia, 10—12 mm longa, obtusiuscula vel acutiuscula, intus lutea, extus viridia. Antherae phyllis breviores, ovato-rotundatae. Capsula obovata, perigonio duplo brevior.

Hab. in Sibiriae pratis.

Typus: Sibiria, distr. Minussinsk, leg. N. Martjanov n° 647; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

G. erubescenti Bess. affinis, sed differt inflorescentia caulis proportione breviore, pedicellis post anthesin erectis etc.

736 8. **G. samojedorum** Grossh. sp. nova (Sect. *Nudiscaposae* Terr.).

Bulbus ovatus, alter minimus; tunicae griseae, numerosae, valde fibrosae; caulis 8—18 cm altus, gracilis, fistulosus; folium radicale solitarium, fistulosum, inflorescentiam superans, 1.5—2 mm in diam., apice attenuatum; folium caulinum inferius inflorescentia brevius, lanceolatum, basi dilatatum, 7—8 mm latum, folium secundum parvum, lineare. Inflorescentia 1—2 (3)-flora; pedicelli fere aequales, longi, tenues, glabri; perigonii phylla 14—15 mm longa, oblongo-elliptica, obtusa, apice paulo angustata, lutea, extus fere non virescentia; antherae perigonio duplo breviores, oblongo-ovatae.

Hab. in prov. Petshora, in pratis et calcareis.

Typus: mons Sablja, leg. V. Soczava; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

Affinis *G. fistulosae* Ker.-Gawl., sed gracilior, inflorescentia pauciflora, perigonii phylla valde obtusa, tunicae semper griseae etc.

9. **G. mirabilis** Grossh. sp. nova (Sect. *Nudiscaposae* Terr.).

Bulbus ovatus, alter minimus; specimina sterilia saepe cum bulbillis minutis numerosis munita; tunicae atro-fuscae, coriaceae; caulis 8—15 cm altus, fistulosus, crassus, sub inflorescentia ad 4 mm in diametro; folium radicale solitarium, fistulosum, 2—4 (5) mm in diametro, inflorescentiam paulo superans, lineare, apice attenuatum; folium caulinum inferius lanceolatum, basi semiamplexicaule 10—12 mm latum, apice angustatum, inflorescentiam aequans vel ea paulo brevius; folium secundum lineari-lanceolatum, inferiore brevius. Inflorescentia subumbellata, 2—6-flora; pedicelli fere aequales, crassi floribus 3—4-plo longiores; perigonii phylla 10—12 mm longa, lanceolato-oblonga, apice attenuata et acutiuscula, pallide lutea extus viridiscentia; stamina perigonio duplo breviora, antheris oblongis. Capsula perigonio 1.5—2-plo brevior, obovata, apice emarginata.

Hab. in planitiebus Kasakstaniae borealis.

Typus: Kasakstan, prov. Aktjubinsk, Mugodshary, prope Ber-Tschogur. 23 V 1927, leg. F. Russanov; in Inst. Bot. Ac. Sc. URSS conservatur.

Affinis *G. anisanthos* C. Koch, sed differt caulibus pedicellisque crassis, tunicis atro-fuscis, nec pallidis etc.

10. **G. Caroli-Kochii** Grossh. sp. nova (Sect. *Euplatyspepmum* Miscz.).

Bulbus ovatus, fibris tenuibus dense vestitus, tunicis griseis; scapus 5—12 cm altus, tenuis, 3—5-florus, rarius uniflorus, tenuiter pubescens; folium radicale solitarium, lineare, tenue, rarius tenuissimum, ca 2, rarius 1—0.5 mm latum; scapus apice et pedicelli tenuiter pubescentes, rarius glabri; folia caulina bina vel pluria, inferius lineari-lanceolatum, floribus saepius brevius vel eos paulo superans. Pedicelli floribus sublongioribus; perigonii phylla glabra, 8—11 mm longa, lutea, dorso virescentia, longe acuminata, apice interdum barbulata. Capsula obovata, perigonio duplo brevior; semina plana.

737 Hab. in Transcaucasia australi (distr. Migry, Nachitschevan) in regione montana media, in declivibus siccis.

Typus: Prope Migry, 15 V 1934, leg. l. Karjagin; in Herb. Azerb. Centr. in Baku conservatur.

Differt a *G. Alexeenkoana* Miscz. scapo graciliore folio basali tenuiore, floribus minoribus, phyllorum forma.

var. **subuniflora** m. (*G. Alexeenkoana* var. *tenuis* Grossh. Фл. Кавк., I (1928) 196). — Scapus uniflorus, rarissime biflorus, 5—8 cm altus. Folium radicale tenuissimum. Cum typo. (Tab. XLIV, fig. 4, a — c).

11. **G. improvisa** Grossh. sp. nova (Sect. *Euplatyspermum* Miscz.)

Bulbus ovoideus, bulbillis numerosis maturis nigro-fuscis, tunicis coriaceis fuscis vel nigro-fuscis; caulis 10—25 cm altus, glaber; folium basale caulem longe superans, cylindraceum fistulosum, 5—6 mm in diametro; folia caulina 2—3 pauca, inferiora lanceolato-oblonga, superiora lanceolata, valde diminuta. Racemus 2—3-florus; pedicelli tenues, subnutantes. Flores 10—12 mm longi; phylla oblongo-elliptica, obtusiuscula, lutea, dorso viridia; antherae oblongae, ovarium oblongo-ellipticum, sessile; stylus crassus, brevis.

Hab. in Transcaucasia australi, respublica Nachitschevan.

Typus: prope oppidum Ordubad, in calcareis IV 1933, leg. T. Heideman et L. Prilipko; in Herb. Azerb. centr. in Baku conservatur.

Differt a *G. Chomutovae* Pascher ex Asia media bulbilis numerosis, tunicis griseis nec atro-fuscis, habitu etc. (Tab. XLIV, fig. 1, a — c).

12. **G. anisopoda** M. Pop. sp. nova (Sect. *Euplatyspermum* Miscz., cycl. *Chloranthae* Grossh.).

Bulbus ovatus parvus, tunicis fuscis reticulatis vestitus apice in vaginam brevem 10—15 mm long. angustam productis; caulis 6—10 cm altus, rectus; folium radicale solitarium, anguste-lineare, ca 1—1.5 mm latum, supra improfunde canaliculatum, subtus carinatum, bilateraliter sulcatum, glabrum, inflorescentiam paulo superans; folia caulina angustissime linearia subcapillacea, superne subito in bracteas abeuntia. Flores solitarii, raro bini, pedicellis subflexuosis; perigonium 8—9 mm long. intus luteum, extus viride; perigonii phylla lineari-oblonga, angusta, apice attenuata, cucullata; antherae oblongae.

Hab. in regione montana media locis aridis Turcomaniae.

Typus ex mont. Kopet-dagh occidentalis; in Herb. Univers. As. Mediae conservatur.

13. **G. Vvedenskyi** Grossh. sp. nova (Sect. *Euplatyspermum* Miscz.).

Bulbus oblongo-ovatus, tunicis griseis, apice fere reticulatim fibrosis; caulis 5—15 cm altus, glaber; folium radicale anguste-lanceolatum (interdum ad 2—3 mm latum), inflorescentia brevius vel paulo longius; folia caulina anguste-linearia, pauce gradatim diminuta. Inflorescentia 2—3-flora, saepe

738 uniflora; pedicelli longi valde inaequales, perigonii phylla oblongo-oblanceolata, (9) 12—16 mm longa, in parte superiore dilatata, apice acuminata, intus pallide lutea, fere alba, extus purpurascentia; stamina perigonio duplo breviora; antherae parvae oblongae. Capsula perigonio $1^1/_2$-plo brevior, obovato-lanceolata, angusta, obtusa hexagona.

Hab. in montibus Pamiro-Alaj et Tjan-Schan, in regione montana media in graminosis.

Typus: in regione montana media, leg. A. Vvedensky; in Herb. Univers. As. Med. in Taschkent conservatur.

Affinis *G. Olgae* Rgl. sed differt floribus pallidioribus, majoribus, perigonii phyllis acutiusculis nec obtusiusculis. A *G. pamirica* Grossh. differt foliis caulinis conformibus ebulbiferis.

14. **G. pamirica** Grossh. sp. nova (Sect. *Euplatyspermum* Miscz.).

Bulbus solitarius ovatus; tunicae subcoriaceae, in vaginam brevem productae, 8—20 mm altae; caulis 4—9 mm altus; folium radicale inflorescentiam paulo superans ut 1—2 folia caulina inferiora anguste-lineare; folia sub inflorescentia valde diminuta, parva, fere capillaria, bulbifera. Flores saepe solitarii; perigonii phylla 9—10 mm longa, lanceolata apice obtusiuscula, lutea, extus viridia; antherae oblongae.

Hab. in montibus Pamiro-Alaj et Tjan-Shan in regione alpina ad 4350 m.

Typus: Fergana jugum alaicum, in fauce Taldyk in decliv. borealis 12.000. 1 Jul. 1901, leg. Alexeenko; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

Ab omnibus speciebus e serie *Euchloranthae* Pascher foliis caulinis valde diminutis, bulbiferis, longe differt.

RHINOPETALUM

15. **R. arianum** A. Los. et Vved. sp. nova.

Bulbus luteolus ad 2 cm in diametro; caulis ad 40 cm altus, 6 mm in diametro, laevis, glaber; folia glaucescentia, glabra, alterna, 2 infima approximata lineari-lanceolata, acuminata, 10—14 mm lata, media anguste-lineari-lanceolata, valde acuminata, 2.5 mm lata, folia floralia parva, approximata, foliis medianis aequilonga vel eis breviora floribus aequilonga. Flores in racemo 1—8, zygomorphi, pedunculis 2—2.5 longiores; perygonii phylla ovato-lanceolata, ad 22 mm lg., 7—9 mm lt., obtusata, pallide-rosea, in parte mediana rosea, nervis purpureis; inferiora basi macula lutea, exteriora sordida obsita, foveae nectariferae calcariformes, inaequales, una magna profunda, ceterae minores; stamina perigonii phyllo duplo breviora, antheris suborbicularibus, purpurascentibus filamentis pubescentibus; pistillum staminibus paulo longius, stylo pallide-viridi stigmate punctato; capsula caudiculata aptera suborbicularis, costis acutatis inferne obtusatis 1.8 mm lg. et lt.

739 Hab.: in arena mobili, in declivibus arenosis Asiae Mediae.

Culta in Horto Bot. Univers. Asiae Mediae, misit Vvedensky (e Kuschka). Typus in Herb. Hort. Bot. Univ. As. Med. in Taschkent conservatur.

A *R. Karelini* Fisch. differt perigonio non tessellato, foliis cauleque glabris et magnitudine.

FRITILLARIA

16. **F. Grossheimiana** A. Los. sp. nova.

Bulbus albidus, orbiculatus 1—1.5 cm in diametro; caulis 5—20 cm altus, glaber, laevis, in parte basali aphyllus, in 2/3 superioribus dense foliatus folia alterna approximata, glauca, late lanceolata et anguste linearia, valde acuminata ad 5 cm lg. Flores 1—2 perigonio anguste campanulato, perigonii phyllis inferioribus oblongo-ovatis, exterioribus ellipticis, angustioribus, 1.7—2 cm longis, extus violaceis, interne luteis tessellatis parte basali sordidioribus, parte superiore pallidioribus; stylus ad 1/3 longitudinis 3-divisus, stamina perigonii phyllis subduplo breviora.

Hab. in declivibus aridis saxosis Transcaucasiae et Persiae bor.

Typus: Azerbeidjan, decliv. austr. m. Sechend. 18 V 1916; leg. Schelkownikow et Schiptschinsky.

Differt a *Fr. Michailowskyi* Fom. perigonio minore et colore.

17. **F. Regelii** A. Los. sp. nova. — *F. ruthenica* Wikstr. var. *bucharica* Rgl. in sched.

Bulbus 1 cm in diametro; caulis ad 40 cm altus, erectus, paulo sulcatus in parte mediana foliatus, parte inferiore aphylla partem foliatam subaequante; folia basalia et inferiora opposita, folia media alterna vel opposita; folia basalia lanceolata, obtusa, folia media et inferiora anguste lanceolata acuminata, omnia erecta 6—7 cm longa, 0.5—1.5 cm lata, multinervia nervis non prominentibus; folia bracteata 2—3, linearia, acuminata, erecta apice paulo spiraliter contorta. Flores praecipue 1, raro 2, deflexi, non nutantes, pedicellis in parte inferiore recurvis 1.5—2 cm longis; perigonium campanulatum fusco violaceum, extus glaucescens, perigonii phyllis ovato-lanceolatis, basi angustatis, apice acuminatis ad 3 cm lg., 9—12 mm lt., foveis nectariferis oblongis superficialibus; antherae filamentum aequilongae, pistillum perigonio brevius, stylis ad 1/3 divisis; capsula 6-aristata, apice emarginata.

Hab. in declivibus montosis, in herbaceis, solo humoso, in Pamiro-Alaj mont. Darvas et Karategin.

Typus. In angustiis Sachan, inter Darvaz et Langar V—VI 1884, leg. Regel; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

Differt a *F. Olgae* Vved. caule unifloro, foliorum dispositione; ab affini *F. ferganensi* A. Los. differt autem floris colore et foliis medianis verticillatis (nec alternis).

740 18. **F. ferganensis** A. Los. sp. nova. — *F. verticillata* auct. fl. As. Med... p. pte.

Bulbus 1 cm in diam.; caulis tenuis sulcatus pallide viridis 25—40 cm altus uniflorus ad 1/3 longitudinis aphyllus, in parte superiore foliatus; folia basalia et inferiora opposita, media 3—4 verticillata, linearia, apice attenuata et acuta, ad apicem plus minus spiraliter torta, ad 12 cm lg., 0.6 cm lata, basalia latiora et breviora, lineari-lanceolata, obtusata; bracteae subuliformes valde contortae. Flores pedicellis brevibus, deflatis; perigonium late-campanulatum basi paulo attenuatum, pallide-roseo-violaceum, basi viridiusculum tessellatum; perigonii phyllis ad 3 cm lg., exterioribus oblongo-ellipticis, obtusis, 0.8—0.9 mm lt., inferioribus oblongo-obovatis apice obtusato-cuspidatis, 1.2—1.3 cm lt., foveis nectariferis oblongis, ad faciem exteriorem perigonii phyllorum prominentibus; stamina perigonio subduplo breviora, filamentis dilatatis, antheris obtusis longioribus; stylo 3-diviso; capsula 1.5 cm lg. late-alata, alis apice acuminatis et emarginatis.

Hab. in declivibus saxosis, in juniperetis mont. Pamiro-Alaj jug. Alaicum et. Transalaicum.

Typus: ad fl. Kandura et Air-Tasch, decliv. bor.-occ. 7 V 1913, leg. O. Knorring; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

Differt a *F. Regelii* sp. nov. foliorum dispositione et florum colore, a *F. Olgae* Vved. caule unifloro, foliorum forma et colore, a *F. verticillata* — caule unifloro, florum colore et foliis angustioribus.

SCILLA

19. **S. atropatana** Grossh. sp. nova (Sect. *Prospero* Baker).

Bulbus ovatus ca 15 mm longus, 8—10 mm latus; scapus tenuis, 10—20 cm altus; folia bina, scapum longe superantia, anguste-linearia, 2—3 mm ata, viridia vel subglaucescentia; scapus bifidus; racemus densiusculus, 10—20-florus; bracteae minimae, ovatae, obtusae, pedicellis multo breviores; pedicelli subarcuati, tenues, 5 mm longi, floribus duplo longiores. Perigonium oblongum, 6 mm longum; segmenta oblongo-linearia, ca 2 mm lata, obtusiuscula, pallide coerulea; stamina perigonio paulo breviora, filamentis non dilatatis, antheris coeruleis; ovarium late obovatum, loculis biovulatis; stylus ovario 2—3-plo longior; capsula obcordato-ovata trivalvis. breviter rostrata; semina nigra, oblonga, basi angustata.

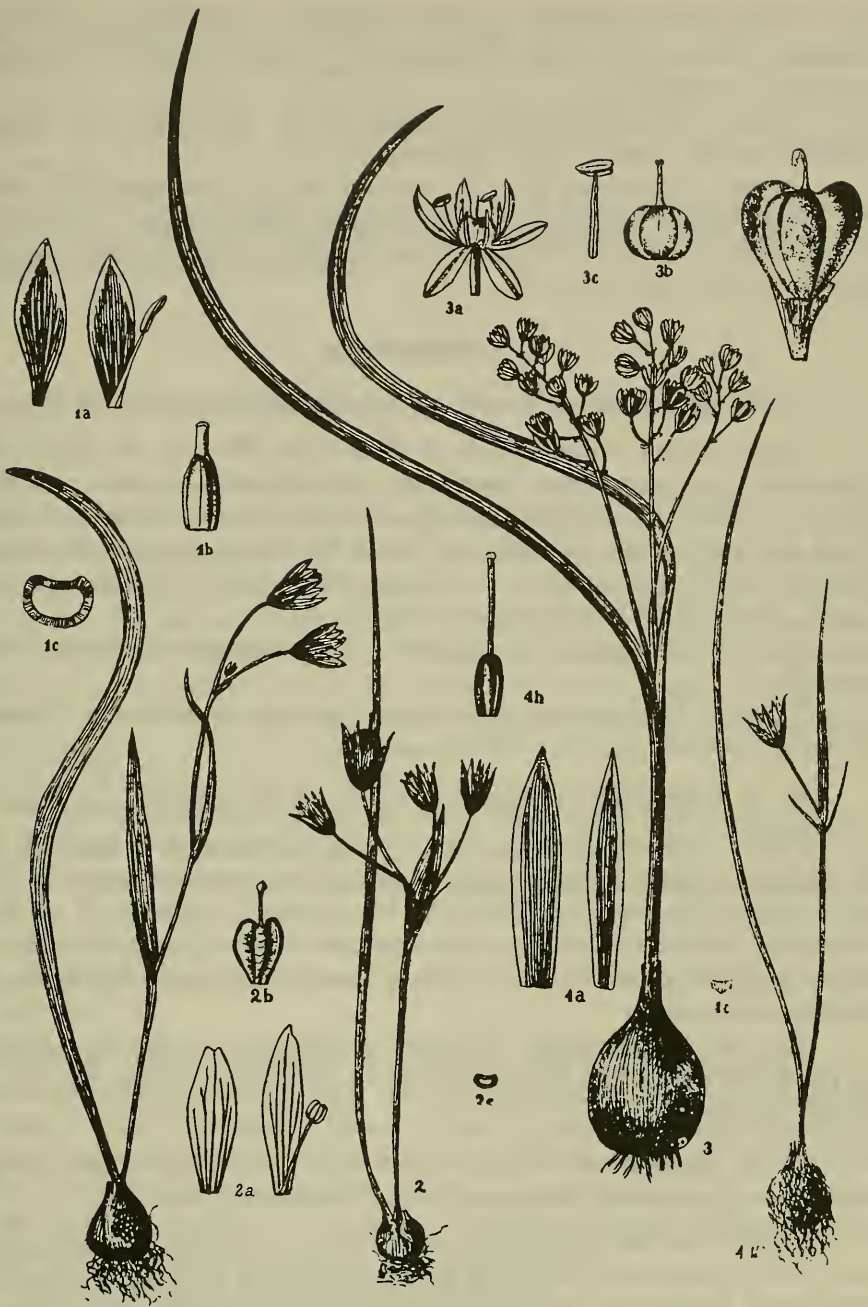

Plate XLIV

1. Gagea improvisa Grossh.: 1a) perianth segments; 1b) ovary; 1c) cross section of leaf.— 2. G. Joannis Grossh.: 2a) perianth segments; 2b) ovary; 2c) cross section of leaf.— 3. Scilla atropatana Grossh.: 3a) flower; 3b) ovary; 3c) stamen; 3d) capsule.— 4. G. Caroli-Kochii Grossh. v. subuniflora Grossh.: 4a) perianth segments; 4b) ovary; 4c) cross section of leaf.

743 Hab. in Transcaucasia australi respublica Nachitshevan in regione montana inferiore et media (Shachtachty, Shachbuz, Dzhulfa, Darry-dagh, Ordubad) in lapidosis.

Typus: Prope Dzhulfa 25 IV 1933, leg. T. Heideman et L. Prilipko; in Herb. Azerb. centr. in Baku conservatur.

Differt a *S. pratensi* W. et K. scapo bifido, foliis angustioribus, capsulae forma, floribus minoribus, a *S. leucophylla* Baker ex Iran occidentali — scapo foliis breviore, nec longiore, bifido, floribus pallide coeruleis nec purpureis etc. (Tab. XLIV, fig. 3, a — d).

ORNITHOGALUM

20. **O. Woronowii** H. Krasch. sp. nova. (Sect. *Heliocharmos* Baker).

Bulbus ovatus; folia linearia, 4—7 mm lata, 20—25 cm longa, dorso albo-lineata, scapo breviora, aequilonga vel longiora. Corymbus pauciflorus (4—8), pedicelli inferiores basi arcuati adscendentes valde elongati, 8—10 cm longi; bracteae anguste-lanceolatae, 1—4 cm longae; perigonii phylla oblongo-obovata, vel ovato-lanceolata, 12—15 mm longa; capsula ovoidea, 6—7 mm longa, angulis alatis binatim approximatis.

Hab in silvis, agris Ciscaucasiae, Transcaucasiae occidentalis, Tauriae australis.

Typus: Transcaucasia occidentalis, Abchasia, Zebelda, leg. Woronow; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

21. **O. Schischkini** H. Krasch. sp. nova. (Sect. *Heliocharmos* Baker).

Bulbus ovoideus, 4—5 cm long.; folia late-linearia, 4—5 mm lata, 25—30 cm longa, subplana, basi sensim attenuata apice obtusata; scapus 15—20 cm altus, tenuis. Corymbus pauciflorus (2—4), pedicelli tenues 1—3 cm longi, subarcuati; bracteae lanceolatae, apice sensim acuminati pedicellis valde breviores; perigonii phylla 2—2.5 cm longa, lanceolata; capsula subglobosa, alis binatim approximatis.

Typus: Transcaucasia orientalis, Atropatania prope pag. Zargeran in pratis silvaticis, leg. Schelkownikow et Woronow; in Inst. Bot. Ac. Sc. URSS conservatur.

22. **O. magnum** H. Krasch. et Schischk. sp. nova. (Sect. *Beryllis* Salisb.). — *O. arcuatum* Boiss. in Fl. Or. V (1884) 215, non Stev.

Bulbus ovoideus non magnus, diametro 2 cm; caules robusti usque ad 1 m alti et 6 mm crassi; folia late lanceolato-linearia, 2—4 cm lata basi attenuata apice breviter acutata. Inflorescentia magna pluriflora, cylindrica laxiuscula, 20—25 cm longa; pedicelli ad 4 mm longi, tempore florendi plus minusve recti erecto-patentes, in fructificatione arcuato-adscendentes capsulam rectam gerentes, bracteae lanceolatae pedicellis 3—4-plo breviores; perigonii phylla oblongo-linearia 2 cm longa, alba, obtusata et ipso apice mucronulata stria

744 mediana viridi demum brunnescente percursa; filamenta late-lanceolata apice subito angustata dimidium perigonii aequantia; capsula ovoidea valvulis subconvexis marginibus depressis, matura 12 - 13 mm longa.

Typus. Caucasus septentrionalis, prope pag. Karas non procul ab oppido Pjatigorsk, leg. Hohenacker"; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

Nostra species affinis est *O. arcuato* Stev. sed caulibus robustioribus usque ad 1 m altis, foliis latioribus apice mucronulatis, phyllis perigonii stria mediana viridi munita sat diversa.

MUSCARI

23. **M. dolychanthum** Woron. et Tron sp. nova (Sect. *Eumuscari* A. Los. nov.).

Bulbus magnus 4 cm in diametro; folia 3—4 ad 35 cm longa, 5—10 mm lata, late linearia, depensa, saepe constricta, scapo florifero valde longiora, supra glaucescentia, infra atro-viridia basi rubescentia; scapus 25—35 cm altus, basi fusco-ruber, erectus. Racemus 7—10 cm longus, longo-cylindricus densus, pluriflorus; pedunculi florum fertilium deflexi, perigonio breviores; pedunculi florum sterilium erecti; perigonium florum fertilium longe cylindricum 8—10 mm longum, 5—6 mm latum violaceo-coeruleum, striis atro-violaceis fauce in maculam abeuntibus, dentes albidi, ovato-triangulares, reflexi, obtusi.

Hab. in regione alpina Transcaucasiae occidentalis.

Typus: Krassnaja Poljana, in monte Aczischcho. Culta in Horto Botanico Academiae Scientiarum URSS (misit Steup anno 1928).

Ab affini *M. polyantho* Boiss. statura, perigonii forma et colore distinctum.

24. **M. Woronowii** A. Los. et Tron sp. nova (Sect. *Pseudomuscari* A. Los. nov.).

Bulbus minimus 1—1.5 cm in diametro; folia late linearia, atro-viridia, paulo concava, paulo canaliculata, infra glaucescentia, 35—40 cm lg., 6 mm lt. scapo longiora. Racemus ad 8 cm longus anguste cylindricus pluriflorus, latus. Flores steriles numerosi, tubulosi, violaceo-coerulei, striati, breve pedunculati; flores fertiles tubuloso-cylindrici, 6—7 mm lg. in fauce paulo constricti; dentibus magnis valde recurvis, violaceo-coeruleis, pedunculi paulo perigonio breviores paulo reflexi; capsula orbicularis.

Hab. in declivibus montium Kopeth-Dagh.

Culta in Horto Botanico Academiae Scientiarum URSS in Leningrad, misit Czernjakowskaja anno 1923 e Turcomania montana.

A *M. leucostomo* Woron. perigonio violaceo-coeruleo, nec atro-violaceo differt.

745 25. **M. Steupii** Woron. et Tron. sp. nova (Sect. *Eumuscari* A. Los. nov.).

Bulbus ovatus magnus ad 4 cm longus; folia 3—4, late-linearia, 5—10 mm lt., 40—60 cm lg. canaliculata apice acutiuscula, dependentia, scapum valde superantia, supra glaucescentia, infra saturate viridia basi rubescentia; scapus 30—35 cm altus basi fusco-ruber. Racemus longe cylindraceus 8—10 cm lg., pedunculis florum fertilum perigonio aequilongis vel eo paulo brevioribus arcuato-deflexis; pedunculis florum sterilium inferioribus horizontalibus, superioribus erectis. Flores fertiles violaceo-coerulei, oblongo doliiformes, ad basin paulo angustati in parte media expansi; perigonium 7—8 mm lg., 5.5 mm lt., in fauce, ad dentium basin albido-marginatum dentibus albidis latis, triangularibus, reflexis; flores steriles minores. Stamina subbiserialia.

Hab. in regione alpina Transcaucasiae occidentalis.

Typus: Krassnaja Poljana in monte Aczischcho; culta in Horto Bot. Ac. Sc. URSS (misit V. Steup, anno 1928); in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

Ab affini *M. dolychantho* differt autem perigonio doliiformi (nec cylindrico).

26. **M. coeruleum** A. Los. sp. nova (Sect. *Pseudomuscari* A. Los.)

Bulbus oblongus 1—2 cm in diametro; folia linearia, basi attenuata, apice acuta, plana, nervosa, 10—18 cm longa, 3 mm lata sub anthesi scapo breviora, post anthesin eo longiora. Racemus breve-ovoideus, compactus, pauciflorus; pedunculi deflexi 1.5 mm longi, coelesti; bracteae albae truncatae, ad 1 mm longae; perigonium ovato-cylindricum, in herbario coeruleum 5 mm longum, 3 mm latum dentibus ovalibus albis suberectis ad 0.75 mm longis. Flores steriles parvi claviformes; antherae orbiculares coeruleae; capsula 4 mm longa, 6 mm lata, basi angustata, apice complanata (truncata).

Typus: Balkaria, Sukan 21 VII 1931, leg. E. et N. Busch.

Differt a *M. pallente* Fisch. floribus et pedunculis coeruleis.

ASPARAGUS

27. **A. Popovii** Iljin sp. nova (Sect. *Neoasparagus** Iljin sect. nov., cladodiis cylindricis, compressis vel irregulariter angulatis. Subsect. *Leptantheri* Iljin subsect. nov., antheris oblongis filamentis aequalibus vel longioribus. Series *Aphylli* Iljin cladodiis nullis).

Caulis 50—80 cm alt. divaricato-ramosus, ramis cylindricis, glabris et laevibus, cladodiis nullis, squamis non calcaratis. Flores solitarii vel bini, lon-

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* Subgen. Euasparagus Baker in Journ. Linn. Soc. XIV (1875) 594. Sect. Archiasparagus Iljin (Stirps A. verticillati p. p. et stirps A. lucidi Baker l. c.). Cladodiis semper manifeste triquetris.

Sect. Neoasparagus Iljin (Stirps A. officinali et stirps A. verticillati Baker, p.p., l. c.) l. c., subsect. Sphaerantheri Iljin, antheris rotundatis filamentis multoties brevioribus.

Subsect. Leptantheri... Iljin l. c.

746 gipedicellati, pedicellis 10—15 mm long., sub flore articulatis, plerumque patentes, perianthium floris feminei 3—4 mm long. late campanulatum. Bacca rotundato-ovalis vel ovalis, apice acuta, 5—7 mm diam.

Hab. in arenis Kara-kum.

Typus: Asia media, Turcomania, st. Perevaljnaja, 26 IV 1889, leg, A. Antonov.

Ab affini *A. turkestanico* M. Pop. pedicellis longioribus, floribus patentibus differt.

28. **A. bucharicus** Iljin sp. nov. (Sect. *Neoasparagus* Iljin, subsect. *Leptantheri* Iljin, series *Foliati* Iljin, cladodiis semper evolutis).

Caulis 30—60 cm alt. divaricato-ramosus, cladodiis in fasciculo 10—40, valde tenuibus, 0.25—0.3 mm diam., brevibus 5—12 mm long., leviter falcatis, in fasciculo divaricatis, atque ramis pilis brevibus, subcrispatis, mollibus dense obtectis, squamis calcarem fere non evolutis. Flores solitarii vel bini, pedicellis 10—20 mm long., sub flore articulatis; perianthium floris masculini 4—5 mm long., campanulatum; perianthium floris feminei 2—2.5 mm long. Bacca circiter 7—8 mm diam.

Hab. in montibus Pamiro-Alaicis.

Typus: Asia Media. Tadshikistan: prope pagum Arzan-czy non procul a Kulab, 14 V 1910, n° 138, leg. R. Roshevitz.

A speciebus omnibus bene dignoscitur.

29. **A. Misczenkoi** Iljin sp. nova. (Sect. *Neoasparagus* Iljin, subsect. *Leptanheri* Iljin, series *Foliati* Iljin).

Caulis flexuosus, divaricato-ramosus, ramis flexuosis basi utrinque ramulis semper evolutis et hic fasciculis cladodiorum divaricatorum instructis, cladodiis in fasciculis 4—10, 10—25 mm long., tenuibus, circiter 0.25 mm diam, leviter falcatis et valde divaricatis, atque ramis glabris, squamis longe calcaratis. Flores longepedicellati, pedicellis 8—12 mm long. supra medium articulatis,apice solum ramorum primariorum dispositi. Bacca sphaeromorpha 6—7 mm diam.

Hab. in Dauria.

Typus: Sibiria Orientalis: Dauria prope Kjachta.

A speciebus omnibus nostris florum dispositione facillime distinctissima.

30. **A. angulofractus** Iljin sp. nova. (Sect. *Neoasparagus* Iljin, subsect. *Leptantheri* Iljin, series *Foliati* Iljin).

Planta 30—80 cm alt., flavescenti-viridis, glabra et laevis; caules et ram angulofracti, cladodiis in fasciculis 1—4, crassiusculis, 1—1.5 mm diam., plerumque 10—45 mm long. deorsum reclinatis, squamis vix conspicue calcaratis. Flores saepius bini, brevissime-pedicellati, pedicellis fructificatione solum elongatis ad 5—6 mm long., per caulem et ramos primarios dispositi; perianthium fl. masc. angusto-campanulatum, flavidum, 5—6 mm lg., pedicellis

747 supra medium, rarius medio vel infra medium articulatis; perianthium fl. fem. cupuliforme, 3—3.5 mm long., pedicellis sub flore articulatis. Bacca sphaeromorpha, 6—8 mm diam.

Hab. in Kasakstania orientali.

Typus: Asia media, arenae prope lacum Balchasch, in valle fl. Ili. 27 VIII 1927, leg. W. Dubjansky et N. Basilevska.

Haec species ad *A. Breslerianum* Schult. appropinquat, sed caulibus atque ramis angulofractis, laevibus manifeste distat.

31. **A. soongoricus** Iljin sp. nov. (Sect. *Neoasparagus* Iljin, subsect. *Leptantheri* Iljin, series *Fcliati* Iljin).

Caulis 20—60 cm alt., divaricato-ramosus, cladodiis inaequalibus, plerumque 1—5 mm long. in fasciculis 3—10, rectis vel leviter falcatis, divaricatis, atque ramis laevibus, crassiusculis, saepius 1—1.5 mm diam.; squamis vix tuberculato-calcaratis vel non calcaratis. Flores bini-quaterni, brevipedicellati, pedicellis medio vel vix supra medium articulatis, flore brevioribus per caulem et ramos primarios dispositi; perianthium fl. masc. 6—7 mm long. Bacca sphaeromorpha, rubra, circiter 7 mm diam.

Hab. in Kasakstania orientali.

Typus: Asia media, regio balchaschensis, in valle fl. Karatae (ostium) 1 VIII 1928, n° 693, leg. V. Smirnov.

Ab affini *A. dahurico* Fisch. cladodiis crassiusculis aberrit.

32. **A. tuberculatus** Bge sp. nova (in Herb. Inst. Bot. Ak. Sc. USSR).

Caulis 30—75 cm, erectus, basi laevis et plerumque lacteus, in parte reliquo scabridus, divaricato-ramosus, cladodiis 4—8 in fasciculis, inaequalibus, 0.5—5 mm longis, divaricatis, raro supra solum solitariis, saepe arcuatis, striatis, scabridis; squamis membranaceis, ramealibus non calcaratis. Flores plus minusve brevipedicellati, pedicellis subaequalibus, medio articulatis, perianthio subaequilongis, plerumque bini in caule et in ramis dispositi; perianthium 5—6 mm longum. Bacca sphaeroidea, 7—8 mm diam., rubra, mox atro-rubra.

Hab. in Dauria, Mongolia, Mandshuria.

Typus: In locis subarenosis Mongoliae chinensis, 1831. leg. Turczaninov.

Ab affini *A. dahurico* Fisch. ramis divaricatis et scabridis, cladodiis inaequalibus in fasciculis magis numerosis differt.

(descripsit M. Iljin).

33. **A. kasakstanicus** Iljin (Sect. *Neoasparagus* Iljin, subsect. *Leptantheri* Iljin, series *Foliati* Iljin).

Caulis 20—50 cm alt. saepe apice flexuosus, ramis plerumque oblique et sursum dispositis, cladodiis 3—4 (1—6) mm long. et 0.75—1 mm lat., in fasciculis saepius ternis, inaequalibus, crassiusculis, complanatis, erectis vel

748 irregulariter et leviter flexuosis fere ad caulem appressis, squamis vix vel non calcaratis. Flores longepedicellati, pedicellis supra medium articulatis, per caulem et partes inferiores ramorum primariorum dispositi, perianthium flavidum. Bacca sphaeromorpha, rubra, 6—7 mm diam.

Hab. in Tauria or., Wolga infer., Kasakstania.

Typus: prope lacum Inder, Aksai, 5 VI 1927, n° 129, leg. M. Iljin et G. Grigoriev.

Ab *A. brachyphyllo* Turcz. cladodiis longioribus, crassioribus, valde inaequalibus etc. recedit.

PARIS

34. **P. manshurica** Kom. sp. nova (Sect. *Euparis* α. petaliferae).

Rhizoma gracilis horizontale, usque 5 mm crassum; caulis erectus usque 3 cm altus; apice verticilla foliorum, basi alabastro oblongo acuto auctus laevissimus; folis 4—8 (saeplus 6—8) breviter petiolatis obovatis, apice acuminatis, varie plus minusve latis vel angustis, oculo nudo trinerviis, venis anastomosantibus; petioli 5—12 mm lg., lamina 3—7 cm lata, 8—10.5 rarius usque 13 cm lg.; pedunculi solitarii 2—8 cm lg.; sepala 4 late vel anguste ovata vel lanceolato-ovata acuminata vel acuta viridia vel rubescentia usque sordide-violacea ca 3.5 cm lg., 1.5 cm lata; petala 4 angustissima patentia, usque recurvata ca 20 mm lg.; stamina plerumque 8 erecta 15—29 mm lg.; connectivo ultra antheram in appendicem 3—8 mm lg. producto; ovarium sessile 8-sulcatum subglobosum nigrum; styli 4 ca 4 mm lg. cirrhosi; bacca coeruleo nigra succosa, seminibus ovatis compressis 4, nigris.

Hab. in silvis frondosis vel mixtis primaevis in declivibus solo sicciore, rarius in silvis ripariis secus fluvia montana. Floret V. VI.

Typus: in valle fl. Sutchan, prope Novitzkoje (foliis octo latis) regionis Primorskaja florae Austro-Ussiriensis. 26 VI 1921, leg. E. N. Alisova; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

A. *P. hexaphylla* Cham. differt foliis sepalisque multo latioribus, sepalis saepius coloratis nec staminum appendice longiore. A *P. obovato* Ldb. foliis numerosioribus amplioribus, sepalis amplioribus coloratis, staminum appendice longiore.

TRILLIUM

35. **T. rhombifolium** Kom. sp. nova.

Rhizoma carnosum ovale 2—2.5 cm crassum, usque 4 cm lg., dense radicibus crassiusculis obsitum; caulis usque 60—65 cm lg. sulcatus glaber erectus, basi squamis brunneis acuminatis membranaceis 1—2 obtectus; apice foliis tribus, fere sessilibus, circa 1.5 cm lg. ac latis rhomboideo late-ovatis, apice breviter acuminatis 3—5 veniis margine integro. Pedicello solitario 3 cm lg. subnutante, flore candido usque 7 cm in diametro; sepala viridia

749 late lanceolata acuta 3—3.5 cm lg., 1—1.2 cm lata, petala 2.7—3.7 cm lg. usque 2 cm lata; stamina 6 antheris filamenta brevissima multo superantibus ovario adpressis 15 mm lg. luteis: capsula 2.5 cm lata ac longa late pyramidata parum succosa, matura viridis; semina numerosa brunnea 2.7 mm lg., 2 mm lata reniformia minute longitudinaliter striatula.

Typus: fl. Suifun, in silvis mixtis vallis Suputinka 14 VI 1913, legit V. L. Komarov; in Herb. Inst. Ac. Sc. URSS conservatur.

A. *T. kamtschatico* Pall. rhizoma crassiore (16 mm), foliis multo amplioribus (12 cm) brevius acuminatis, venis plus evolutis, petalis angustioribus (2.7 cm); semina multo ampliora fere glabra latiora (2.5 mm lg., fere sulcata).

GALANTHUS

36. **G. Woronowii** A. Los. sp. nova.

Bulbus magnus 3—4 cm in diametro; scapus 20—25 cm altus, cylindrico-costatus; folia 15—20 cm longa 1.5 cm lata luteoviridia, late linearia, apice attenuata et callosa, plana, post anthesin quam scapam longiora et introrsum plicata; perigonii phylla exteriora 20 mm longa, 13 mm lata, ovato elliptica, inferiora 11 mm longa, 8 mm lata, plana, basi cuneata apice cordata, maculis viridibus cordatis, basi truncatis; anthera mucronata. Flores odorati.

Hab. in montosis Transcaucasiae occ. et Caucasi centralis.

Culta in Horto Botanico Academiae Scient. URSS, misit Steup anno 1928 e Krassnaja Poljana.

Typus in Herb. Inst. Bot. Ac. Sc. URSS.

Differt a *G. caucasico* (Baker) Grossh. foliis plicatis, a *G. plicato* M. B. floribus minoribus, foliis luteo-viridibus, neque, introrso plicatis.

CROCUS

37. **C. Michelsoni** B. Fedtsch. sp. nova.

Cormus elongato-subglobosus circa 20—25 mm in diametro; tunicae membranaceae, in fibras longitudinaliter fissae, fuscae, apice productae, caulis basin obtegentes; folia basilaria vaginantia 4—5, albomembranacea, caulem et folia viridia amplectentia, folia viridia florendi tempore parum evoluta, fructificationis tempore folia usque 30 cm longa, circa 2 mm lata, nuda; carina eorum latiuscula. Involucri folium basilare non evolutum; involucrum florale e foliis membranaceis duobus constans. Perigonii violacei tubus elongatus (circ. 7.5 longus), fauce nudus; limbi laciniae lanceolatae, circ. 30—32 mm longae et 10—11 mm latae; laciniae interiores paulo breviores; stamina pistillum fere aequantia, lutescentia, filamenta antheras aurantiacas paulo superantia; stylus apice breviter fissus in stigmata tria subintegra; capsula ovoidea oblonga.

Hab. in locis lapidosis regionis altimontanae jugi Kopet-dagh.

750 Typus: prope stationem meteorologicam Cheirabad, alt. supra mare circa 2000 m, detexit Paschinski 1931; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

A specie proxima *C. Korolkovii* Rgl. et Maw. colore florum optime differt.

GLADIOLUS

38. **G. turkmenorum** E. Czerniak. sp. nova. — *G. atroviolaceus* var. *floribus pallidioribus majoribus* Bornm. et Sint. in exs. n°. 306 transc.-pers. 1900—01.

Bulbi ad 2 cm in diam.; tunicae radicales supernae fuscae, infernae brunneae, tenui-fibrosae, parte superiore integrae, subreticulato-fibrosae, areolis angusto-elongatis, inferne fibris parallelis, super sub tunica laterna calyptra brevi compacta membranacea; caulis 45—85 cm altus, 3-foliatus; folia viridia, caule subaequilonga, omnia lanceolata, 6—13 mm lata, longe-acuminata, inaequinervia, folium superius inflorescentia breivus; folium primum vaginatum ad 5 cm lg., folium inferius 9—20 cm lg., obliquotruncatum, obtusum. Spica unilateralis, compacta, longa, interdum ad 30 cm lg., multiflora, bracteae virides, late-lanceolatae, 3.5—4 cm lg., inferiores externae foliaceae, ad 7—11 cm lg.; flores 8—12, oblique-reclinati, 4—4.5 cm lg. purpureo-rosei, tubo perigonii 10 mm longo subcurvato; lobi laterales labii inferioris oblongo-obovati, in unguem brevem attenuati sub-acuminati, lobo superiore longiores, lobi laterales labii superioris lobo superiore breviores; antherae filamentis subduplo longiores, acuminatae ad 15 mm longae; stigmata obovata. Capsulae 11, elliptico-ovatae, 16—20 cm lg., 1 cm diam., valvis membranaceis, coriaceis, seminibus magnis rubro-brunneis, 2.5—3 mm diam. apteris.

Typus: Turcomania. Montes Kopet-dagh ad pagum Wannovskoje. 17 IV 1912 n° 1340 leg. V. Lipsky; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

Differt a *G. segeti* foliis angustioribus, floribus minoribus et reclinatis, spica unilaterali multiflora, capsula longiore et elliptico-ovata.

39. **Holopogon** Kom. et Nevski gen. novum.

Flores hermaphroditi, albi. Sepala petalaque subaequalia, circ. 3 mm longa, subpatentia, uninervia; sepala oblongo-lanceolata, obtuse acuminata, dorso vix papilligera, lateralia leviter obliqua; petala obovato-oblonga, obtusa, glabra. Labellum petalis simile, integrum, oblongo-obovatum, 3 mm longum, circ. 1.5 mm latum, obtusum, concavulum, uninerve, subpatens. Gynostemii 2.5 mm longi structura Neottiarum nonnularum; anthera terminalis, biloculari; pollinia 2 granulosa, viscidio sine stipite affixa. Ovarium longiuscule pedicellatum, papillosum.

Herba saprophytica habitu *Neottiae camtschateae*.

751 Genus a *Neottia* Sw. s. str. praesertim labelli integri oblongo-obovati fabrica et florum colore distinctum. Nonnulae *Neottiae* (*N. asiatica* Ohwi, *N. acuminata* Schlechter etc.) fieri potest pertinent ad genus nostrum, attamen quoque bene differunt labello sepalis vulgo acuminatissimis breviore, gynostemio abbreviato et glabritate absoluta.

40. **H. ussuriensis** Kom. et Nevski sp. nova* Herba 15—20 cm alta, saprophytica rhizomate brevi, dense radicibus tenuibus simplicibus obsesso, caule stricto tereti aphyllo vaginis 3—4 membranaceis 1.5—2 cm longis superne laxis sed limbo orbatis, racemo paucifloro, circ. 5 cm longo axi dense papilligero, floribus 4—9 albis; bracteis membranaceis papillosis pedicellis circ. 5 mm longis vix tortis subbrevioribus; sepalis petalisque subsimilbus uninervibus, labello integro sepalis non longiore.

Typus: Oriens Extremus, districtus Possjet, in valle Kedrovaja, in umbra arborum, 24 VIII 1935, lg. V. L. Komarov.

HABENARIA

41. **H. dianthoides** Nevski sp. n.—*H. radiata* (Thunb.) Miq. f. *pauciflora* Kom. in Bull. Jard. Bot. de Pierre Gr. XVI (1916) 159.

Pumila, caule 13—20 cm alto; foliis lineari-lanceolatis, 1.5—3.5 cm lg., 0.2—0.5 cm lt.; flore vulgo solitario basi bractea ovato-lanceolata longe acuminata. 8—10 mm lg. viridi donato; sepalo intermedio concavo elliptico-ovato, obtuso, 6—7 mm lg., 3—3.5 mm lt. dorso costato-nervoso; sepalis lateralibus 7 mm lg. viridibus; petalis albis, plurinerviis late ovatis vel orbiculato-ovatis, 7—8 mm lg., 5—7 mm lt., obliquis, obtuse acuminatis margine vix crenatis, rarius (basi) 2—3 denticulatis, labello reniformi, magno, 12 mm lg.,

* A saprophytic plant, destitute of chlorophyll, its habit resembling that of Neottia camtschatea (L.) Rchb. f.; rhizome short, densely beset with simple slender radiating roots; stem leaves replaced by membranous sheaths slightly dilated at apex; raceme loosely few-flowered, the rachis and bracts densely papillose; pedicels longer than ovary, very slightly twisted; flowers 4—9, white; sepals and petals 1-nerved, subequal, ca. 3 mm long; sepals oblong-lanceolate, subobtuse, slightly papillose on the back; petals more obtuse, glabrous; lip entire, obtuse, very slightly concave, drooping, resembling in size the other perianth segments, 3 mm long and ca. 1.5 mm broad; column 2.5 mm long, of the Neottia type.

Undoubtedly a distinct genus, the features distinguishing it from Neottia Sw. s. str. being chiefly the small entire lip and flower color. As regards lip shape, certain Neottia species (N. asiatica Ohwi, N. acuminata Schlechter) should perhaps also be referred to this genus; these plants, however, differ markedly in complete absence of vesture, the strongly abbreviated column, and the lip being much shorter than the long-acuminate sepals and petals.

Holopogon ussuriensis was collected by V.L. Komarov at Kedrovaya Pad in the Pos'et area (Far East: Uss.) in a mixed wood, upon decomposing remnants of a felled tree trunk (24 August, 1935).

752 20—24 mm lt., apice trilobato lobo intermedio minore, 5—7 mm lg. basi 2.5—4 mm lt., deltoideo, obtuse acuminato, integerrimo, lateralibus semicordatis margine fimbriato-dentatis; calcari recto, cylindrico, apice vix clavato-incrassato, 1.2—2.5 cm lg.

Appropinquat ad *H. radiatam* Miq., sed differt petalorum obtusiorum forma, labelli lobo intermedio latiore brevioreque, lateralibus margine fimbriato-dentatis, nec fere longe fimbriatis et habitu graciliore.

Typus: Oriens Extremus, in pratis humidis ad litora maritima prope ostium fluvii Mongugai 26 VIII 1913 leg. N. Diukina; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

42. **Pseudodiphryllum** Nevski gen. novum.

Flores virescentes, perparvi sepalis circ. 2 mm lg. Sepalum intermedium oblongum vel oblongo-rotundatum, obtusum, uninerve, membranaceum; sepala lateralia oblonga, divergentia. Petala oblongo-obovata, obtusa, trinervia, crassiuscula. Labellum patens, rotundatum vel rotundato-ovatum, obtusum, integerrimum, crassiusculum vix 1—1.25 mm lg., basi breviter, calcaratum, calcari cylindraceo, apice leviter clavato-incrassato, 2 mm lg. Columna brevissima. Polliniorum glandulae nudae. Rostellum trilobatum. Stigma quadratum,

Typus gen.: *Pseudodiphryllum Chorisianum* (Cham.) Nevski=*Habenaria Chorisiana* Cham. in Linnaea III (1828) 31.

PLATANTHERA

43. **P. cornu-bovis** Nevski sp. nova. — *P. mandarinorum* Kom. Fl. Mansh. I (1901) 516; Kränzl. Orchid. Sib. Enum. in Fedde Repert. Beih. LXV (1931) 57, non Rchb. f. in Linnaea XXV (1852) 226.

Tuberibus oblongo-ovatis, basi ad 7 mm crass. apice longissime attenuatis caule 20—50 cm alt. prope medium phyllo unico oblongo-lanceolato vel oblongo-elliptico obtuso, supra medium phyllis 1—3 parvulis lanceolatis, acutis donato; spica laxa, pauciflora, oblonga, 5—12 (16) cm lg., circ. 3 cm in diam.; bracteis ovato-lanceolatis vel lanceolatis, inferioribus circ. 2 cm lg. flores aequantibus, superioribus eis brevioribus; floribus virescentibus; sepalo intermedio late ovato vel orbiculari-ovato, apice interdum paulo attenuato, obtuso, 5—6 mm lg., 4—6 mm lt., sepalis lateralibus oblongis 6—7 mm lg , 1.5—2.5 mm lt. obliquis, obtusis; petalis 6—6.5 mm lg. basi ovatis, obliquis, 3 mm lt., superne subito acuminatis oblongo-linearibus 0.5—0.75 mm lt., labello lineari 8—9 mm lg. basi circ. 1.75—2 mm lt., obtuso; calcare arcuato, crasso, cylindrico vel cylindraceo-conico, apice acuto, ovario 1.5—2-plo longiorae; anthere connectivo latissimo loculis divergentibus.

Typus: Oriens Extremus, in valle fl. Jodziche, in silva, 8 VII 1907, lg. N. Desoulavy, n° 1168; in Herb. Inst. Bot. Sc. URSS conservatur.

753 Appropinquat ad *P. Maximoviczianam* Schlechlter (= *P. minor* Maxim., non Rchb. f.), sed differt labello angustiore lineari (nec lanceolato basi fere rhomboideo), calcari valde curvato, antherae loculis minus divergentibus et habitu; *P. mandarinorum* Rchb. f. differt a specie nostra calcari longissimo fere recto.

44. **P. extremiorientalis** Nevski sp. nova. — *P. chlorantha* F. Schmidt, Reise Amurl. (1868) 181, non Cust. ex Rchb. f.

Species intermedia inter *Platantheram bifoliam* et *P. Freynii;* a priori antherae loculis leviter divergentibus et calcari crassiore brevioreque; a posteriori antherarum connectivo angustiore differt.

Typus: Sachalin, Dui, 19 VII 1861, leg. Glehn; in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

45. **Chusua** Nevski gen. novum.

Spica laxa, pauciflora, vulgo secunda. Flores basi bractea herbacea viridi donati. Sepalum intermedium cum petalis in galeam connivens, lateralia ovato-lanceolata, obtuse acuminata, reflexa. Labellum rhomboideum vel rotundato-rhomboideum, trilobatum vel integrum, basi cuneato angustatum, calcaratum, calcari cylindraceo. Anthera obovata loculis parallelis. Pollinia clavaeformia in caudiculum brevem producta; polliniorum glandulae in sacculos duos rostelli distinctos semiglobosos immersae. — Plantae parvae tuberibus globosis vel ovatis. — Genus a *Galeorchide* Rydb. tuberibus distinctum.

Typus gen.: *Chusua secunda* Nevski. = *Orchis pauciflora* Fisch. ex Lindl. Gen. et Sp. Orch. (1835) 280, non Tenore.

ORCHIS

46. **O. amblyoloba** Nevski sp. nova. — *O. basilica* ssp. *Carthaliniae* Klinge in A. H. P. XVII, 1 (1898) 196, pro min. pte.

Tuberibus 2—4-palmatis, compressis; caule stricto, 25—55 (60) cm alto, supra basin 3—5 (7—9) mm crasso; foliis 3—5 (8) patentibus, maculatis, infimo oblongo-lanceolato vel oblongo-obovato, obtuso vel obtusiusculo, 7—12 (15) cm lg., (1.2) 1.5—2.5 (3.5) cm lt., basi angustato; intermediis angustioribus, obtusiusculis, 9—15 cm lg. 1—2 (2.5) cm lt., superioribus (1—2) bracteiformibus, anguste lineari-lanceolatis, acuminatis, 2.5—7 cm lg., (1.5) 2—5 (7) mm lt.; spica cylindrica, densa, multiflora, 5—14 (17) mm lg., 2.5—3.5 cm in diam.; bracteis floribus brevioribus solum inferioribus floribus $1^1/_2$-plo longioribus, anguste lanceolatis vel lineari-lanceolatis, 2.2—8 cm lg., 2.5—3.5 (4) mm lt.; floribus roseo-lilacinis, labello basi violaceo-punctulato punctis parvulis in lineas divergentes interruptas constitutis; sepalo intermedio oblongo-elliptico, obtuso, concavo, (6) 7—8 mm lg., circiter 3 mm lt., trinervi; sepalis lateralibus ovato-lanceolatis vel ovatis, obliquis, 3—4-nerviis, obtusiusculis vel obtusis, 8—10 mm lg., 3—4 mm lt.; petalis ovatis,

754 obtusis, sepalis brevioribus; labello supra brevissime papilloso, rotundato-rhombeo vel rotundato transversi-elliptico, 7—8 (9) mm lg., 8.5—10 (12) mm lt., apice breviter trilobato, lobo intermedio late ovato, obtusissimo, 3—3.5 mm lg., 2.5—3 (3.25) mm lt., lateralibus fere rhomboideis, obtusis, paulo brevioribus; calcari recto, cylindrico, apice obtuso, 8—10 mm lg., 2.25—2.5 mm crasso ovarium subaequante.

Typus: Georgia, distr. Borzhom, prope pagum Bakuriani, 1500 m; in silva, 26 VII 1925, leg. V. Kozlovsky — in Herb. Inst. Bot. Ac. Sc. URSS conservatur.

Species ex affinitate *O. sacciferi* Brogn. labelli forma et colore distincta.

ALPHABETICAL LIST
of Families and Genera Appearing in Volume IV

	English page	Russian page
Acelidanthus Trautv. et Mey.	7	9
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Adamsia Willd.	302	394
Allium L.	87	112
Allioideae Engler	47	61
Amaryllidaceae Lindl.	363	475
Amaryllis Pall.	373	489
Amblirion Raf.	232	302
Ammolirion Kar. et Kir.	33	42
Anacamptis L.C.Rich.	546	718
Anthericum L.	40	53
Asparagoideae Vent.	324	422
Asparagus L.	325	424
Asphodeline Rchb.	24	31
Asphodeloideae Vent.	24	39
Barnadia Lindl.	285	372
Belamcanda Adans.	439	576
Bellevalia Lapeyrouse	303	395
Bifolium Gaertn.	346	453
Bulbocodium L.	16	20
Calloscordum Herbert.	215	279
Calypso Salisb.	460	604
Cephalanthera L.C.Rich.	478	630
Chamaeorchis L.C.Rich.	499	644
Chusua Nevski.	509	670
Clintonia Raf.	343	448
Coeloglossum Hartm.	492	647
Colchicum L.	18	23
Comperia C.Koch.	513	676
Convallaria L.	357	467
Corallorhiza Hall.	462	608
Corona Fisch. et R.Grah.	232	302
Crocus L.	381	499
Cypripedieae Lindl.	453	595
Cypripedium L.	453	595
Cyrtopodieae Pfitzer.	463	609
Cythera Salisb.	460	604
Dactylorhiza Neck.	500	697
Danaë Medic.	339	442
Diaphane Salisb.	421	554
Dioscorea L.	377	495
Dioscoreaceae Lindl.	377	494
Diphryllum Raf.	465	611
Disporum Salisb.	348	454
Ephippianthus Rchb. f.	460	607
Epipactis Adans.	471	620
Epipogon S.G.Gmel.	483	635
Eremurus M.B.	27	37
Erythronium L.	280	364
Eulophia R.Br.	464	609
Fritillaria L.	232	302
Funkia Spreng.	41	54
Gagea Salisb.	47	61
Galanthus L.	364	476
Galeorchis Rydb.	508	669
Gastrodia R.Br.	483	636
Gladiolus L.	440	578
Goodyera R.Br.	486	639

	English page	Russian page
Gymnadenia R.Br.	507	667
Gynandriris Parl.	423	556
Gyrostachys Pers.	484	637
Habenaria Willd.	487	641
Helleborine Hill.	471	620
Hemerocallis L.	43	55
Henningia Kar. et Kir.	36	47
Herminium R.Br.	489	643
Himantoglossum W.D.Koch.	546	719
Himantoglossum Spreng.	546	719
Holopogon Kom. et Nevski.	471	620
Hosta Tratt.	41	54
Hyacintella Schur.	313	407
Hyacinthus Tourn.	311	405
Juno Tratt.	424	557
Ibidium Salisb.	484	637
Imperialis Adans.	232	302
Iridaceae Lindl.	380	498
Iris L.	390	511
Ixiolirion Fisch.	373	489
Kolpakowskia Rgl.	373	489
Korolkowia Rgl.	227	295
Leopoldia Parl.	314	409
Leucorchis E.Mey.	493	648
Leucojum L.	366	480
Liliaceae Hall.	1	1
Lilioideae	216	280
Lilium L.	216	282
Limnorchis Rydb.	505	664
Limodorum L.C.Rich.	482	634
Liparis L.C.Rich.	458	601
Listera R.Br.	465	611
Lloydia Salisb.	281	365
Loroglossum L.C.Rich.	546	719
Lysiella Rydb.	504	663
Majanthemum Wigg.	346	453
Malaxideae Lindl.	456	599
Malaxis Soland.	457	599
Melanthaceae R.Br.	2	2
Melanthioideae Engl.	2	2
Merendera Ramond.	12	13
Microstylis Nutt.	457	600
Morucodon Salsib.	232	302
Muscari Mil.	316	412
Muscarimia Kostel.	315	411
Mosharia Salisb.	315	411
Narcisus L.	375	491
Narthecium (Moer.) Huds.	4	5
Nectarobotryum Ldb.	281	365
Nectaroscordum Lindl.	216	279
Neolindleya Kranzl.	491	646
Neottia Sw.	469	617
Neottianthe Schlechter	490	645
Neottieae Lindl.	464	610
Oncocyclus Siems.	405	531
Ophioscordon Wallr.	109	142
Ophrydeae Lindl.	487	641
Ophrys (L.) Sw.	549	722
Oporanthus Herbert.	370	485
Oreorchis Lindl.	463	609
Orchidaceae Lindl.	448	589
Orchideae Hall.	448	589
Orchis L.	514	677
Ornithogalum L.	292	379
Pancratium L.	376	494
Paris L.	358	469
Peramium Salisb.	486	639
Perularia Lindl.	495	650
Phyllodolon Salisb.	150	195
Platanthera L.C.Rich.	496	652
Plecostigma Turcz.	86	111
Pogonia Juss.	464	610
Polygonatum Adans.	346	456
Pseudodiphryllum Nevski.	494	649
Puschkinia Adams.	302	394
Rhinopetalum Fisch.	228	296
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	English page	Russian page
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Smilacoideae Engl.	362	474
Smilax L.	362	474
Spiranthes L.C.Rich.	484	637
Stenanthium Kunth.	5	6
Sternbergia W.K.	370	485
Steveniella Schlechter	511	675
Streptopus L.C.Rich.	348	455
Synsiphon Rgl.	18	23
Tamus L.	380	497
Tofieldia Huds.	2	3
Traunsteinera Rchb. f.	510	671
Trilium L.	361	473
Tulipa L.	246	320
Ungernia Bge.	367	481
Veratrum L.	8	10
Xiphion Medik.	421	554
Zeuxine Lindl.	487	640
Zygadenus L.C.Rich.	5	9

VEGETATION REGIONS OF THE USSR

Abbreviated name	Full name
I. Arctic	
1. Arc. Eur.	Arctic (European part)
2. Nov. Z.	Novaya Zemlya
3. Arc. Sib.	Arctic (Siberia)
4. Chuk.	Chukchi
5. An.	Anadyr
II. European part	
6. Kar.-Lap.	Karelia-Lapland
7. Dv.-Pech.	Dvina-Pechora
8. Balt.	Baltic States
9. Lad.-Ilm.	Ladoga-Il'men
10. U.V.	Upper Volga
11. V.-Kama	Volga-Kama
12. U. Dnp.	Upper Dnieper
13. M.D.	Middle Dnieper
14. V.-Don	Volga-Don
15. Transv.	Transvolga area
16. U. Dns.	Upper Dniester
17. Bes.	Bessarabia
18. Bl.	Black Sea area
19. Crim.	Crimea
20. L. Don	Lower Don
21. L.V.	Lower Volga
III. Caucasus	
22. Cisc.	Ciscaucasia
23. Dag.	Dagestan
24. W. Transc.	Western Transcaucasia
25. E. Transc.	Eastern Transcaucasia
26. S. Transc.	Southern Transcaucasia
27. Tal.	Talysh
IV. West Siberia	
28. Ob.	Ob region (from the eastern slopes of the Urals to the Yenisei R.)

29. U. Tob.	Upper Tobol
30. Irt.	Irtysh
31. Alt.	Altai

V. East Siberia

32. Yenis.	Yenisei
33. Lena-Kol.	Lena-Kolyma
34. Ang.-Say.	Angara R.-Sayans
35. Dau.	Dauria

VI. Far East

36. Kamch.	Kamchatka
37. Okh.	Okhotsk
38. Ze.-Bu.	Zeya-Bureya
39. Uda	Uda R. area
40. Uss.	Ussuri
41. Sakh.	Sakhalin

VII. Soviet Central Asia

42. Ar.-Casp.	Aral-Caspian
43. Balkh.	Lake Balkhash area
44. Dzu.-Tarb.	Dzungaria-Tarbagatai
45. Kyz. K.	Kyzyl-Kum
46. Kara K.	Kara-Kum
47. Mtn.-Turkm.	Mountainous part of Turkmenistan
48. Amu D.	Amu Darya
49. Syr D.	Syr Darya
50. Pam.-Al.	Pamir-Alai
51. T. Sh.	Tien Shan

Accepted Regions for Indication of General Distribution of Species Appearing in "Flora of the U.S.S.R."

I.	Arc.	- Arctic (Spitsbergen, Greenland and farther)
II.	Scand.	- Scandinavia (Norway, Denmark, Sweden, Finland)
III.	Centr. Eur.	- Central Europe (Germany, Poland, Czechoslovakia, Hungary, Austria, Switzerland)
IV.	Atl. Eur.	- Atlantic Europe (Netherlands, Belgium, England, France, Portugal)
V.	Med.	- Mediterranean (including North Africa) (V' Western, V'' Eastern)
VI.	Bal.-As. Min.	- Balkan Peninsula and Asia Minor
VII.	Arm.-Kurd.	- Lesser Armenia and Kurdistan
VIII.	Iran.	- Iran and Afghanistan
IX.	Ind.-Him.	- India and Himalayas

X.	Dzu.-Kash.	-	[Dzungaria-Kashgar area] Eastern or Chinese Turkestan (Sinkiang)
XI.	Mong.	-	Mongolia
XII.	Jap.-Ch.	-	Japan and China
XIII.	Ber.	-	North American coast of the Bering Sea
XIV.	N. Am.	-	North America (U.S.A. and Canada)
XV.	Tib.	-	Tibet

Other Geographical Abbreviations

Afr.	Africa
Aust.	Australia
Centr.	Central
E.	East(ern)
Gr.	Great, Greater
Is.	Island, Islands
Mt.	Mount
Mts.	Mountains
N.	North(ern)
R.	River
S.	South(ern)
W.	West(ern)

TRANSLATOR'S NOTE

The Russian term "Srednyaya Aziya" is in English Central Asia (or Soviet Central Asia). Therefore the term Middle Asia has been used for Russian "Tsentral'naya Aziya", which is non-Soviet inner Asia, comprising western China (Sinkiang and Tibet) and Mongolia.

EXPLANATORY LIST OF ABBREVIATIONS OF RUSSIAN INSTITUTIONS AND PERIODICALS APPEARING IN THIS TEXT

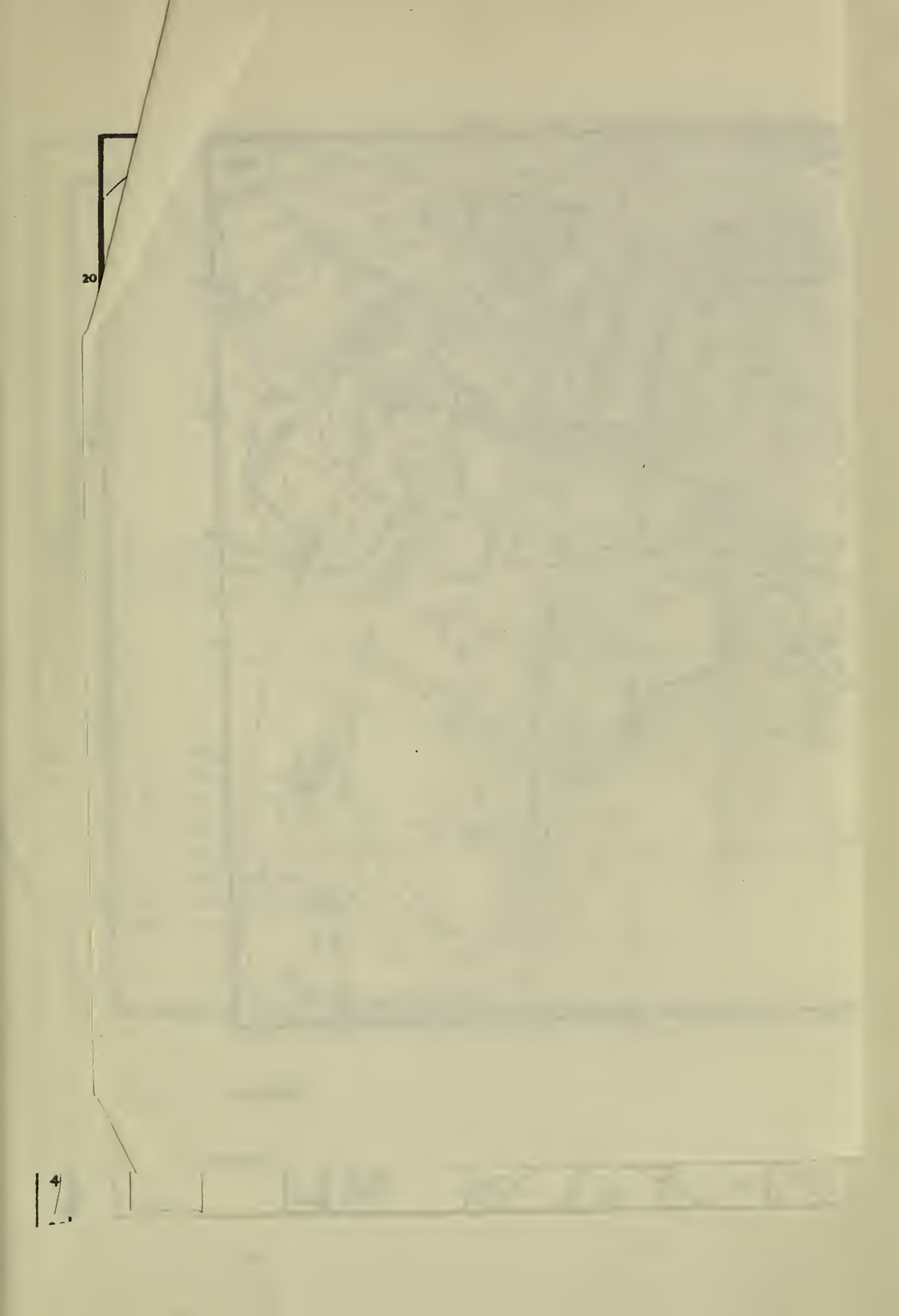
Abbreviation	Full names (transliterated)	Translation
Bot.-geogr. issled. v Turkest.	Botaniko-geograficheskie issledovaniya v Turkestane	Botanical and Geographical Investigations in Turkestan
Bot. Mat. Gerb. Bot. inst. AN SSSR	Botanicheskie Materialy Gerbariya Botanicheskogo instituta AN SSSR	Botanical Materials of the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR
Bot. Mat. Gerb. Gl. Bot. Sada	Botanicheskie Materialy Gerbariya Glavnogo Botanicheskogo Sada	Botanical Materials of the Herbarium of the Main Botanical Gardens
Bot. zap. SPb. univ.	Botanicheskie zapiski Sankt-Peterburgskogo universiteta	Botanical Notes of St. Petersburg University
Bot. zhurn. SSSR	Botanicheskii zhurnal SSSR	Botanical Journal of the USSR
Byull. Glavn. Bot. Sada	Byulleten' Glavnogo Botanicheskogo Sada	Bulletin of the Main Botanical Gardens
Byull. Obshch. lyubit. estestvozn., antrop. i etnogr.	Byulleten' Obshchestva lyubitelei estestvoznaniya, antropologii i etnografii	Bulletin of the Naturalists', Anthropologists' and Etnographers' Society
Dendr.	Dendrarii	Arboretum
Der. i kust.	Derev'ya i kustarniki	Trees and Shrubs
Der. i kust. Kavk.	Derev'ya i kustarniki Kavkaza	Trees and Shrubs of the Caucasus
Dikie polezn. i technich. rasteniya SSSR	Dikie poleznye i tekhnicheskie rasteniya SSSR	Wild Useful Plants and Industrial Crops of the USSR
Dikorastuchchie r. Kavkaza, ikh rasprostranenie, svoistva i primenenie	Dikorastushchie rasteniya Kavkaza, ikh rasprostranenie, svoistva i primenenie	Wild Plants of the Caucasus, Their Distribution, Properties and Uses
Dokl. AN Azerb. SSR	Doklady Akademii Nauk Azerbaidzhanskoi SSR	Reports of the Academy of Sciences of the Azerbaijan SSR
Fl.	Flora	Flora
Fl. Abkh.	Flora Abkhazii	Abkhazian Flora

Fl. Almat. zapovedn.	Flora Alma-Atinskogo zapovednika	Flora of the Alma-Ata Reserve
Fl. Alt.	Flora Altaya	Altai Flora
Fl. Alt. i Tomsk. gub.	Flora Altaiskoi i Tomskoi gubernii	Flora of Altai and Tomsk Provinces
Fl. Az. Ross.	Flora Aziatskoi Rossii	Flora of Asiatic Russia
Fl. Evrop. Rossii	Flora Evropeiskoi Rossii	Flora of European Russia
Fl. Gruzii	Flora Gruzii	Georgian Flora
Fl. Kamch.	Flora Kamchatki	Kamchatkan Flora
Fl. Kavk.	Flora Kavkaza	Caucasian Flora
Fl. Man'chzh.	Flora Man'chzhurii	Manchurian Flora
Fl. Sev. Kraya	Flora Severnogo Kraya	Flora of the Northern Territory
Fl. Sib.	Flora Sibiri	Siberian Flora
Fl. Sib. i Dal'n. Vost.	Flora Sibiri i Dal'nego Vostoka	Flora of Siberia and the Far East
Fl. Sr. Ross.	Flora srednei Rossii	Flora of Central Russia
Fl. Sr. i Yuzh, Ross.	Flora srednei i yuzhnei Rossii	Flora of Central and Southern Russia
Fl. Talysh.	Flora Talysha	Talysh Flora
Fl. Yugo-Vost.	Flora Yugo-Vostoka	Flora of the Southeast
Fl. Zap. Sib.	Flora Zapadnoi Sibiri	Flora of West Siberia
Gerb. donsk. fl.	Gerbarii donskoi flory	Herbarium of Don Flora
Gerb. Orlovsk. gub.	Gerbarii Orlovskoi gubernii	Herbarium of Orel Province
Gerb. Ukr. fl.	Gerbarii Ukrainskoi flory	Herbarium of Ukrainian Flora
GRF	Gerbarii Russkoi Flory	Herbarium of Russian Flora
Ill. Fl. Mosk. gub.	Illyustrirovannaya Flora Moskovskoi gubernii	Illustrated Flora of Moscow Province
Izv. AN SSSR	Izvestiya AN SSSR	Bulletin of the Academy of Sciences of the USSR
Izv. Bot. Sada	Izvestiya Botanicheskogo Sada	Bulletin of the Botanical Gardens
Izv. Bot. Sada. Petra Vel.	Izvestiya Botanicheskogo Sada Petra Velikogo	Bulletin of Peter the Great Botanical Gardens
Izv. Gl. Bot. Sada	Izvestiya glavnogo Botanicheskogo Sada	Bulletin of the Main Botanical Gardens
Izv. Kavk. Muzeya	Izvestiya Kavkazskogo Muzeya	Bulletin of the Caucasian Museum
Izv. Kazakhst. fil. AN SSSR	Izvestiya Kazakhstanskogo Filiala Akademii Nauk SSSR	Bulletin of the Kazakhstan Branch of the Academy of Sciences of the USSR
Izv. Kievsk. Bot. Sada	Izvestiya Kievskogo Botanicheskogo Sada	Bulletin of the Kiev Botanical Gardens
Izv. Obshch. lyubit. estest. vozn., antrop. i etnogr.	Izvestiya Obshchestva lyubitelei estestvoznaniya, antropologii i etnografii	Bulletin of the Naturalists', Anthropologists' and Ethnographers' Society
Konsp. rast. okr. Khar'kova	Konspekt rastenii okruga Khar'kova	Compendium of Plants of Kharkov
Korm. rast estestv. senokosovi i pastb. SSSR	Kormovye rasteniya estestvennykh senokosov i pastbishch SSSR	Fodder Plants of Natural Hay-meadows and Pastures of the USSR

Lesn. zhurn.	Lesnoi zhurnal	Forestry Journal
Mat. (dlya) Fl. Kavk.	Materialy dlya Flory Kavkaza	Materials on Caucasian Flora
Nov. obozr.	Novoe obozrenie	New Review
Och. obozr. i fl. Karpat	Ocherki rastitel'nosti i flory Karpat	Survey of Carpathian Vegetation and Flora
Ocherk. Tifl. fl.	Ocherki Tiflisskoi flory	Survey of Tiflis [Tbilisi] Flora
Opis. Amur. obl.	Opisanie Amurskoi oblasti	Description of the Amur Region
Opred. der. i kust.	Opredelitel' derev'ev i kustarnikov	Key to Trees and Shrubs
Opred. rast. Dal'nevost. kr.	Opredelitel' rastenii Dal'nevostochnogo kraya	Key to Plants of Far Eastern Territory
Opred. rast. Kavk.	Opredelitel' rastenii Kavkaza	Key to Caucasian Plants
Opred. vyssh. rast.	Opredelitel' vysshikh rastenii	Key to Higher Plants
Opred. (vyssh.) rasten. Evrop. casti SSSR	Opredelitel' (vysshikh) rastenii Evropeiskoi chasti SSSR	Key to Higher Plants of the European USSR
Perech. rast. Turk.	Perechen' rastenii Turkmenii	List of Turkmenian Plants
Putesh.	Puteshestviya	Travels
Rast. i fl. Karp.	Rasteniya i flora Karpat	Plants and Flora of the Carpathians
Rast. letn. pastb. Gandzh.	Rasteniya letnikh pastbishch Gandzhi	Vegetation of Gandzha [now Kirovabad] Summer Pastures
Rast. res. Turkm.	Rastitel'nye resursy Turkmenii	Plant Resources of Turkmenia
Rast. resursy Kavkaza	Rastitel'nye resursy Kavkaza	Plant Resources of the Caucasus
Rast. Sib.	Rastitel'nost' Sibiri	Vegetation of Siberia
Rast. Sr. Az.	Rastitel'nost Srednei Azii	Vegetation of Soviet Central Asia
Rastit. Kavk.	Rastitel'nost' Kavkaza	Vegetation of the Caucasus
Rastit. pokrov. vost. Pamira	Rastitel'nyi pokrov vostochnogo Pamira	Plant Cover of the Eastern Pamirs
Rastit. syr'e Kazakhst.	Rastitel'noe syr'e Kazakhstan	Plant Resources of Kazakhstan
Rastit. Turkm.	Rasteniya Turkmenii	Vegetation of Turkmenia
Rezul't. dvukh puteshestv. na Kavk.	Rezul'taty dvukh puteshestvii na Kavkaz	Results of Two Travels to the Caucasus
Russk. Fl.	Russkaya Flora	Russian Flora
Russk. lek. rast.	Russkie lekarstvennye rasteniya	Russian Medicinal Plants
Sbor, sushka i raz. lek. rast.	Sbor, sushka i razvitie lekarstvennykh rastenii	Gathering, Drying and Development of Medicinal Plants
Sorn. rast. SSSR	Sornye rasteniya SSSR	Weed Plants of the USSR
Sov. Bot.	Sovetskaya Botanika	Soviet Botany
Spis. rast.	Spisok rastenii	List of Plants

Tr. Bot. inst. AN SSSR	Trudy Botanicheskogo instituta AN SSSR	Transactions of the Botanical Institute of the Academy of Sciences of the USSR
Tr. Bot. Sada	Trudy Botanicheskogo Sada	Transactions of the Botanical Gardens
Tr. Bot. Sada Yur'evsk. Univ.	Trudy Botanicheskogo Sada Yur'evskogo Universiteta	Transactions of the Botanical Gardens of Yur'ev [now Tartu] University
Tr. Dal'nevost. bazy AN SSSR	Trudy Dal'nevostochnoi bazy AN SSSR	Transactions of the Far Eastern Base of the Academy of Sciences of the USSR
Tr. Inst. nov. lub. syr'ya	Trudy Instituta novogo lubyanogo syr'ya	Transactions of the Institute of New Fiber Raw Materials
Tr. Obshch. isp. prir. Khar'k. univ.	Trudy Obshchestva ispytatelei prirody Khar'kovskogo universiteta	Transactions of Naturalists' Society of Kharkov University
Tr. Peterb. obshch. estestvoisp.	Trudy Peterburgskogo obshchestva estestvoispytatelei	Transactions of St. Petersburg Naturaliats' Society
Tr. pochv.-bot. eksp. Peresl, upr.	Trudy pochvenno-botanicheskoi ekspeditsii Pereslavskogo upravleniya	Transactions of the Soil-Botanical Expedition of Pereslavl Administration
Tr. po geobot. obsled. pastb. Azerb.	Trudy po geobotanicheskim obsledovaniyam pastbishch Azerbaidzhana	Transactions of Geobotanical Investigations of Azerbaijan SSR Pastures
Tr. prikl. bot. (gen. i sel.)	Trudy po prikladnoi botanike, genetike i selektsii	Transactions of Applied Botany, Genetics and Selection
Tr. Ross. Obshch. sadov.	Trudy Rossiiskogo obshchestva sadovodov	Transactions of the Russian Horticulturists' Society
Tr. SAGU	Trudy Sredneaziatskogo Gosudarstvennogo Universiteta	Transactions of the Soviet Central Asian State University
Tr. Sarat. obshch. estestvoisp.	Trudy Saratovskogo obshchestva estestvoispytatelei	Transactions of the Saratov Naturalists' Society
Tr. Sil'sko-gospod. komit. bot.	Trudy sil'skohospodar'skoho komiteta botaniky	Transactions of the Botanical Agricultural Committee
Tr. SPb. obshch. estestv.	Trudy Sankt-Peterburgskogo obshchestva estestvoispytatelei	Transactions of the St. Petersburg Naturalists' Society
Tr. Tadzh. bazy AN SSSR	Trudy Tadzhikskoi bazy AN SSSR	Transactions of the Tadzhikistan Base of the Academy of Sciences of the USSR
Tr. Tbil. bot. inst.	Trudy Tbiliskogo botanicheskogo instituta	Transactions of Tbilisi Botanical Institute

Tr. Tbil. (or Tifl.) bot. sada	Trudy Tbilisskogo (Tifliskogo) botanicheskogo sada	Transactions of the Tbilisi (Tiflis) Botanical Garden
Tr. Turkmensk. bot. sada	Trudy Turkmenskogo botanicheskogo sada	Transactions of the Turkmenian Botanical Garden
Tr. Turk. nauchn. obshch.	Trudy Turkmenskogo nauchnogo obshchestva	Transactions of the Turkmenian Scientific Society
Vest. Akad. Nauk (or AN) Kazakhsk. SSR	Vestnik Akademii Nauk Kazakhskoi SSR	Bulletin of the Academy of Sciences of the Kazakh SSR
Vestn. estestv. nauk	Vestnik estestvennykh nauk	Bulletin of Natural Sciences
Vestn. Ross. Obshch. sadov.	Vestnik Rossiiskogo obshchestva sadovodov	Bulletin of the Russian Horticulturists' Society
Vest. Tifl. bot. sada	Vestnik Tiflisskogo botanicheskogo sada	Bulletin of Tiflis Botanical Garden
Vizn. (or Vznachn.) rosl. URSR	Viznachnyk roslyn USSR	Key to Plants of Ukrainian SSR
V obl. polupustyni	V oblasti polupustyni	(In the) Semidesert Region
Yadov. rast. lugov i pastb.	Yadovitye rasteniya lugov i pastbishch	Poisonous Plants of Meadows and Pastures
Zam. po sist. i geogr. rast. Tbil. bot. inst.	Zametki po sistematike i geografii rastenii Tbilisskogo botanicheskogo instituta	Notes on Taxonomy and Geography of Plants of the Tbilisi Botanical Institute
Zhurn. Bot. obshch.	Zhurnal Botanicheskogo obshchestva	Journal of the Botanical Society
Zhurn. opytn. agron. Yugo-Vost.	Zhurnal opytnoi agronomii Yugo-Vostoka	Journal of Experimental Agronomy of the Southeast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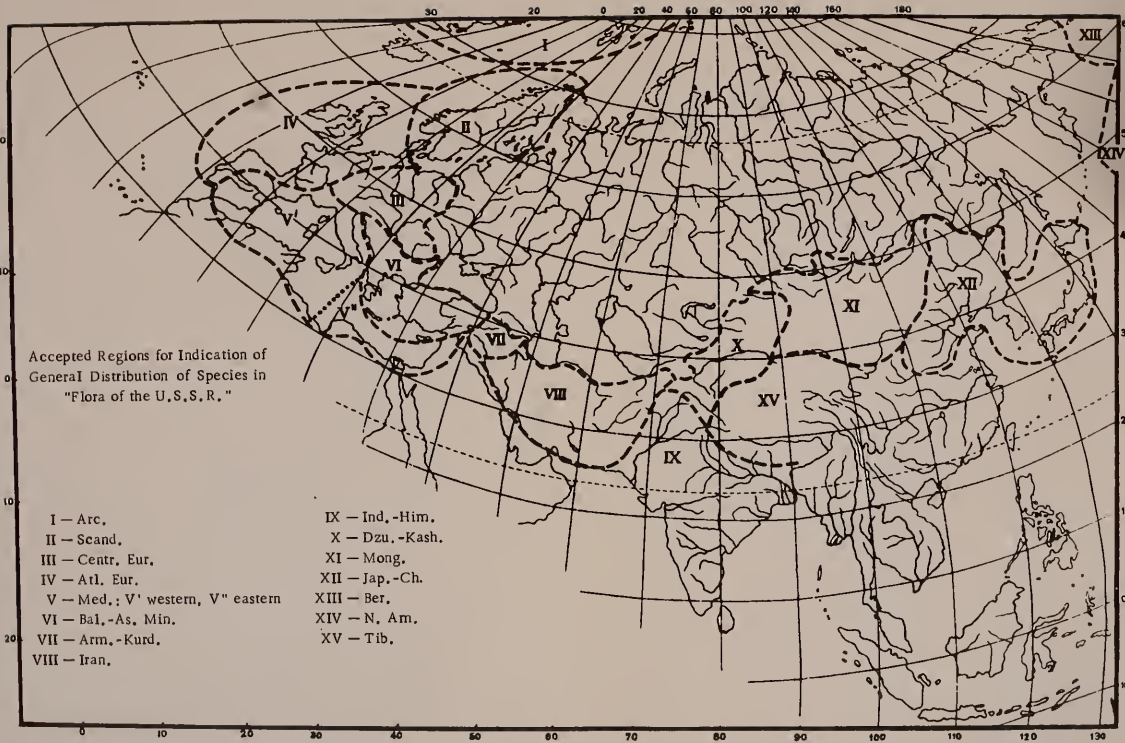
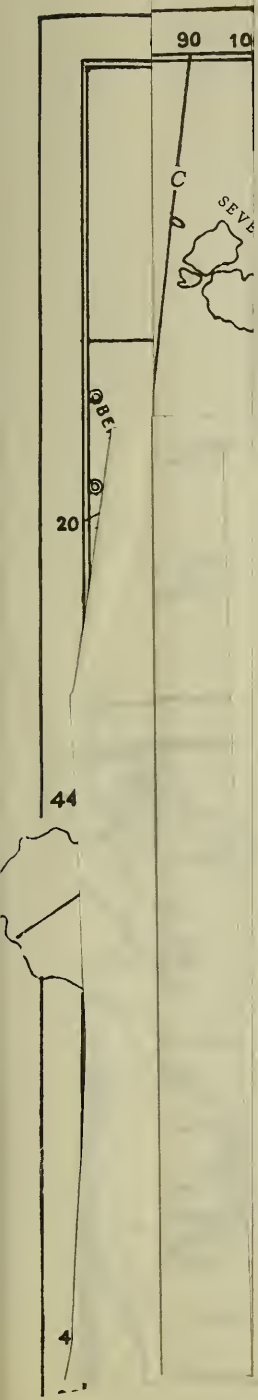

Accepted Regions for Indication of
General Distribution of Species in
"Flora of the U.S.S.R."
I — Arc.
II — Scand.
III — Centr. Eur.
IV — Atl. Eur.
V — Med.; V' western, V" eastern
VI — Bal.-As. Min.
VII — Arm.-Kurd.
VIII — Iran.
IX — Ind.-Him.
X — Dzu.-Kash.
XI — Mong.
XII — Jap.-Ch.
XIII — Ber.
XIV — N. Am.
XV — Tib.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FLORA REGIONS OF
THE U.S.S.R.
BARENTS SEA
KARA SEA
ARCTIC OCEAN
NOVAYA ZEMLYA
SEVERNAYA ZEMLYA
NOVOSIBIRSKIE IS.
LAPTEV SEA
EAST SIBERIAN SEA
WRANGEL ISLAND
FRANZ JOSEF LAND
BERING SEA
SEA OF OKHOTSK
SEA OF JAPAN
BLACK SEA
CASPIAN SEA
ARAL SEA
KAR. - LAP
LAD. - ILM.
ARC. EUR.
ARC. SIB.
BALT
U. DNS.
U. DNP
M. D.
U. V.
V. - DON
V. - KAMA
DV. - PECH.
OB
YENIS.
LENA-KOL.
OKH.
KAMCH.
CHUK.
AN.
BES.
BL.
L. DON
TRANSV.
L. V.
U. TOB.
IRT.
ANG. - SAY.
DAU.
ZE. - BU.
UDA.
SAKH.
USS.
AR. - CASP.
BALKH.
ALT.
KARA K.
KYZ. K.
T. SH.
PAM. - AL.
1 – CRIM.
2 – CISC.
3 – W. TRANSC.
4 – E. TRANSC.
5 – S. TRANSC.
6 – DAG.
7 – TAL.
8 – MTN. - TURKM.
9 – AMU D.
10 – SYR D.
11 – DZU. - TARB.
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